SLV-E830B/E830NP/E830VC1/E830VC2

RMT-V224/V224B

SERVICE MANUAL

French Model
SLV-E830B

Spanish Model
SLV-E830NP

Germany Model
SLV-E830VC1/E830VC2

Hi-Fi

VHS

- **Refer to the SERVICE MANUAL of VHS MECHANICAL ADJUSTMENTS Ⅵ for MECHANICAL ADJUSTMENTS. (9-921-647-11)**

S MECHANISM

SPECIFICATIONS

System

Channel coverage
- PAL (B/G)
- VHF E2 to E12
- VHF Italian channels A to H
- UHF E21 to E69
- CATV S01 to S05, S1 to S20
- HYPER S21 to S41

RF output signal
- UHF channels 21 to 69

Aerial out
- 75-ohm asymmetrical aerial socket

Inputs and outputs

LINE-1 (TV)
- 21-pin
- Video input: pin 20
- Audio input: pins 2 and 6
- Video output: pin 19
- Audio output: pins 1 and 3

LINE-3 IN
- 21-pin
- Video input: pin 20
- Audio input: pins 2 and 6

LINE-2 IN
- VIDEO IN, phono jack (1)
- Input signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
- AUDIO IN, phone jack (2)
- Input level: 327 mVrms
- Input impedance: more than 47 kilohms

AUDIO OUT
- Phono jack (2)
- Rated output level: 327 mVrms
- Load impedance: 47 kilohms
- Output impedance: less than 10 kilohms

General

Power requirements
- 220 – 240 V AC, 50 Hz

Power consumption
- 23 W

Operating temperature
- 5°C to 40°C

Storage temperature
- –20°C to 60°C

Dimensions
- Approx. 430 × 100 × 314 mm (w/h/d) including projecting parts and controls

Mass
- Approx. 4.6 kg

Supplied accessories

Remote commander (1)
R6 (size AA) batteries (2)
Aerial cable (1)
Audio cable (1)
EURO-AV cable (1)

Design and specifications are subject to change without notice.

VIDEO CAMERA RECORDER

MICROFILM

SONY®

FEATURE DIFFERENCE

MODEL NAME (SLV-)	E830VC1	E830VC2	E830NP	E830B
SAFETY SECAM (REC/PB)				○/○
ME-SECAM (REC/PB)				×/○
ACS (△: ACA)	△	△	○	○
TUNER (BTF-)	3WC402		WC411	3WC443
SYSTEM 1	BG	BG	BG	L
STEREO	ZWEI	ZWEI	N/Z	NI
SYSTEM 2				BG
STEREO				ZWEI
RF OUT SYS	G	G	G	L/G
REMOTE COMMANDER (RMT-)	V224	V224	V224	V224B

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer.

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, through functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replace-ment.
5. Check the B+ voltage to see it is at the values specified.
6. Flexible Circuit Board Repairing
   - Keep the temperature of the soldering iron around 270˚C during repairing.
   - Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
   - Be careful not to apply force on the conductor when soldering or unsoldering.

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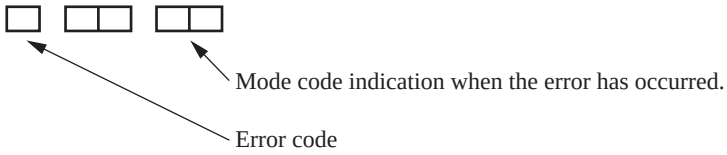
1. ERROR CODE INDICATION

- Error codes are indicated using the lower 5 digits in the fluorescent display tube.
  "At this time, Colon ":" between character is not indicated."



ERROR CODE

0	No error
1	Cam encoder error Loading direction
2	Cam encoder error Unloading direction
3	T reel error
4	S reel error
5	Capstan error
6	Drum error
7	Error on initializing
8	Cassette loading error
9	Reserve

MODE CODE

0	Power-on eject	10	FWD x1	20	REW play
1	Power-on initial	11	FWD x2	21	Cas. loading
2	Power-off eject	12	CUE	22	Tape loading
3	Power-off stop	13	PB-pause	23	Power-off loading
4	FF	14	RVS-pause	24	Mecha. error (Power on)
5	REW	15	RVS x1	25	Power-on eject initial
6	REC	16	RVS x2	26	Power-off eject initial
7	REC- pause	17	REV	27	APC REC
8	Power-on stop	18	Power-off initial	28	Cas. loading
9	PB	19	Mecha. error (Power off)		(No auto PB check)

SECTION 1
GENERAL

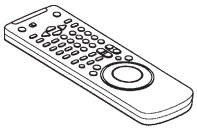
This section is extracted from instruction manual.

Step 1

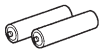
Unpacking

Check that you have received the following items with the VCR:

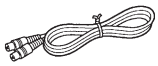
- Remote commander



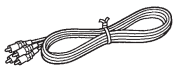
- R6 (size AA) batteries



- Aerial cable



- Audio cable



- EURO-AV cable

Checking your model name

The instructions in this manual are for the 2 models : SLV-E830VC and SLV-E830NP. Check your model number by looking at the rear panel of your VCR. The SLV-E830NP is the model used for illustration purposes. Any difference in operation is clearly indicated in the text, for example, "SLV-E830VC only."

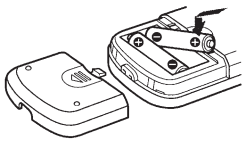
Step 2

Setting up the remote commander

Inserting the batteries

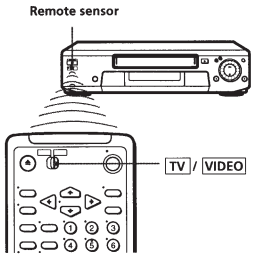
Insert two R6 (size AA) batteries by matching the + and – on the batteries to the diagram inside the battery compartment.

Insert the negative (-) end first, then push in and down until the positive (+) end clicks into position.



Using the remote commander

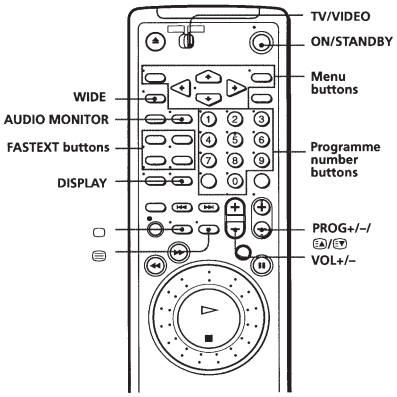
You can use this remote commander to operate this VCR and a Sony TV. Buttons on the remote commander marked with a dot (•) can be used to operate your Sony TV. If the TV does not have the ■ symbol near the remote sensor, this remote commander will not operate the TV.



To operate	Set TV / VIDEO to
the VCR	VIDEO and point at the remote sensor on the VCR
a Sony TV	TV and point at the remote sensor on the TV

continued

Step 2 : Setting up the remote commander (continued)



TV control buttons

To	Press
Turn the TV into standby or active mode	ON/STANDBY
Select an input source of the TV either from aerial in or from line in	TV/VIDEO
Select the programme position of the TV	Programme number buttons PROG +/–
Adjust the volume of the TV	VOL +/–
Switch to TV (Teletext off)	▢ (TV)
Switch to Teletext	▤ (Teletext)

To	Press
Select the sound	AUDIO MONITOR
Use FASTEXT	FASTEXT buttons
Call up on-screen display	DISPLAY
Change the Teletext page	▲/▼
Operate TV menu options	Menu buttons
Switch the wide mode of a Sony wide TV (For other manufacture's wide TV, see "Controlling other TVs with the remote commander" see below.)	WIDE

Notes

- In normal use, the batteries should last about three to six months.
- If you do not use the remote commander for an extended period of time, remove the batteries to avoid possible damage from battery leakage.
- Do not use a new battery with an old one.
- Do not use different types of batteries together.

Controlling other TVs with the remote commander

The remote commander is preprogrammed to control non-Sony TVs. If your TV is listed in the table below, set the appropriate manufacturer's code number.

1 Set TV / VIDEO at the top of the remote commander to TV.
2 Hold down ON/STANDBY, and enter your TV's code number(s) using the programme number buttons. Then release ON/STANDBY.
Now you can use the following TV control buttons to control your TV: ON/STANDBY, TV/VIDEO, programme number buttons, PROG +/–, VOL +/–, ▢ (TV), ▤ (Teletext), FASTEXT buttons, and WIDE with some TV.

Tip

- If you set your TV's code number correctly while the TV is turned on, the TV turns off automatically.

continued

Step 2 : Setting up the remote commander (continued)

Code numbers of controllable TVs

If more than one code number is listed, try entering them one at a time until you find the one that works with your TV.

To make wide mode settings, see the footnotes below this table for the applicable code numbers.

Manufacturer	Code number
Sony	01*1, 02, 03, 04, 05
Aiwa	32
Akai	68
Blaupunkt	10, 21
Brionvega	40
C.G.M	09
Colonad	03
Dual	44
Emerson	03, 04
Fenner	30, 31
Ferguson	52
Gold Star	03, 04, 17
Grundig	10*1, 11*1
Hitachi	24
Hyper	31
Inno-Hit	41
Irradio	20
ITT	15, 16, 69*3
JVC	33*1
Loewe	45
Mitsubishi	27*1, 28*1, 50*1, 51*1
Mivar	09

Manufacturer	Code number
NEC	66
Nokia	15, 16, 69*3
Nordmende	35, 42
Orion	47, 48
Panasonic	17*1, 49
Philips	06*1, 07*1, 08*1
Phonola	18, 19
Pioneer	26
Saba	12, 13
Samsung	22, 23
Sanyo	25
Schneider	46
Seleco	14
Sharp	29
Siemens	39
Sinudyne	37
TEAC	67
Telefunken	36
Thomson	43*2
Toshiba	38
White Westinghouse	34

*1 Press WIDE to switch the wide picture mode on or off.
*2 Press WIDE, then press VOL +/– to select the wide picture mode you want.
*3 Press WIDE. The menu appears on the TV screen. Then, press CURSOR ↑/↓/←/→ to select the wide picture you want and press OK.

Notes

- If the TV uses a different remote control system from the one programmed to work with the VCR, you cannot control your TV with the remote commander.
- If you enter a new code number, the code number previously entered will be erased.
- When you replace the batteries of the remote commander, the code number automatically resets to 01 (Sony). Reset the appropriate code number.

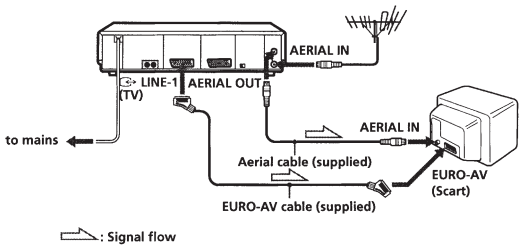
Getting Started

Step 3

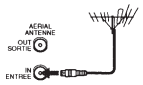
Connecting the VCR

If your TV does not have a EURO-AV connector, see page 13.

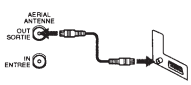
If your TV has a EURO-AV (Scart) connector



1 Disconnect the aerial cable from your TV and connect it to AERIAL IN on the rear panel of the VCR.

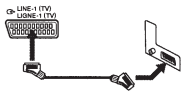


2 Connect AERIAL OUT of the VCR and the aerial input of your TV using the supplied aerial cable.



3 Connect LINE-1 (TV) on the VCR and the EURO-AV (Scart) connector on the TV with the supplied EURO-AV cable.

This connection improves picture and sound quality. If your TV doesn't have a EURO-AV (Scart) connector, see page 13.



4 Connect the mains lead to the mains.

Note

- If the TV is connected to the LINE-1 (TV) connector, setting the RF MODULATOR to OFF is recommended (initial setting). In the OFF position, only the signal from the aerial is output through the AERIAL OUT connector (see page 66). You do not have to tune your TV to the VCR . Skip "Tuning your TV to the VCR" on page 15.

continued

Getting Started

About the SMARTLINK features

SMARTLINK

If the connected TV complies with SMARTLINK, NexTView Link, MEGALOGIC*1, or EASYLINK*2, you can use the SMARTLINK function after you complete the steps on the previous page (the SMARTLINK indicator appears in the VCR's display window when you turn on the TV). You can enjoy the following SMARTLINK features.

- Preset Download

  You can download your TV tuner preset data to this VCR and tune the VCR according to that data in Auto Set Up. This greatly simplifies the Auto Set Up procedure.

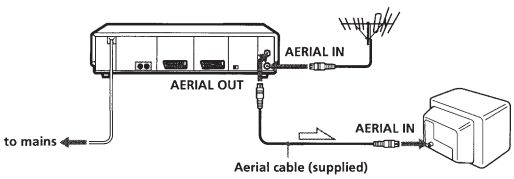
  See "Setting up the VCR with Auto Set Up" on page 17.

- TV Direct Rec
  You can easily record what you are watching on the TV (other than tapes being played on this VCR). For details, see "Recording what you are watching on the TV (TV Direct Rec)" on page 46.
- One Touch Play
  With One Touch Play, you can start playback automatically without turning on the TV. For details, see "Starting playback automatically with one button (One Touch Play)" on page 42.
- One Touch Menu
  You can turn on the VCR and TV, set the TV to the video channel, and display the VCR's on-screen display automatically by pressing MENU on the remote commander.
- One Touch ShowView
  You can turn on the VCR and TV, set the TV to the video channel, and display the ShowView menu automatically by pressing ShowView on the remote commander.
- Automatic Power Off
  You can have the VCR turn off automatically, if the VCR is not used for about 1 minute, after you turn off the TV.
- NexTView Download
  You can easily set the timer recording by using the NexTView Download function of your TV. Please, refer to your TV's instruction manual.

*1 "MEGALOGIC" is a registered trademark of Grundig Corporation.
*2 "EASYLINK" is a trademark of Philips Corporation.

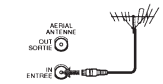
Note
- Not all the TVs respond to the functions above.

If your TV doesn't have a EURO-AV (Scart) connector



: Signal flow

1 Disconnect the aerial cable from your TV and connect it to AERIAL IN on the rear panel of the VCR.



2 Connect AERIAL OUT of the VCR and the aerial input of your TV using the supplied aerial cable.

3 Connect the mains lead to the mains.

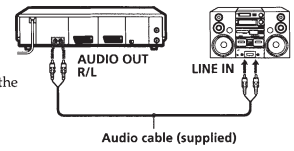
You now have to tune your TV to your VCR (see page 15).

continued

Additional connection

To a stereo system

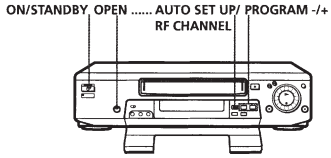
You can improve sound quality by connecting a stereo system to the AUDIO OUT R/L jacks as shown on the right.



Step 4

Tuning your TV to the VCR

If you have connected the VCR to your TV using the EURO-AV cable, skip this step.



1 ON/STANDBY

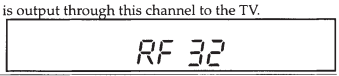
Press ON/STANDBY to turn on the VCR.

OPEN .....

Press OPEN to open the drop down panel.

2 AUTO SET UP / RF CHANNEL

Press briefly AUTO SET UP/RF CHANNEL on the VCR.
The factory-preset RF channel appears in the display window.
The VCR signal is output through this channel to the TV.



3 Turn on your TV and select a programme position for the VCR picture.

This channel will now be referred to as the video channel.

4 Tune the TV to the same channel as the one shown in the display window so that the picture on the right appears clearly on the TV screen.

Refer to your TV manual for tuning instructions.

If the picture does not appear clearly, see "To obtain a clear picture from the VCR" on page 16.

continued

Step 4 : Tuning your TV to the VCR (continued)

5 AUTO SET UP / RF CHANNEL — Press AUTO SET UP/RF CHANNEL.

You have now tuned your TV to the VCR. From now on, whenever you want to play a tape, set the TV to the video channel.

To check if the TV tuning is correct

Set the TV to the video channel and press PROGRAM -/+ on the VCR. If the TV screen changes to a different programme each time you press PROGRAM -/+, the TV tuning is correct.

To obtain a clear picture from the VCR

If the picture does not appear clearly in step 4 above, press PROGRAM -/+ in step 4, so that another RF channel appears. Then tune the TV to the new RF channel until a clear picture appears.

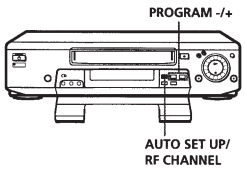
Note

- When you connect the VCR and your TV only with an aerial cable, you have to set RF MODULATOR in the OPTIONS menu to ON (see page 66).

Step 5

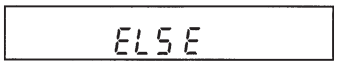
Setting up the VCR with the Auto Set Up function

Before using the VCR for the first time, set up the VCR using the Auto Set Up function. With this function, you can set the language for the on-screen display, TV channels, and the VCR clock.



1 AUTO SET UP / RF CHANNEL — Press AUTO SET UP/RF CHANNEL on the VCR for more than 3 seconds.

The VCR automatically turns on, and the country abbreviation appears in the display window.



continued

Step 5 : Setting up the VCR with Auto Set Up (continued)

2 - PROGRAM + — Press PROGRAM -/+ to highlight the abbreviation of your country.

For some countries, there is a selection of languages to choose from.

The abbreviations of the countries are as follows:

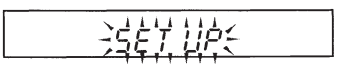
Abbreviation	Country	Language
A	Austria	German
B-D	Belgium	German
B-F	Belgium	French
B-N	Belgium	Dutch
CH-D	Switzerland	German
CH-F	Switzerland	French
CH-I	Switzerland	Italian
D	Germany	German
DK	Denmark	English
E	Spain	Spanish

Abbreviation	Country	Language
I	Italy	Italian
L-D	Luxemburg	German
L-F	Luxemburg	French
N	Norway	English
NL	Netherlands	Dutch
P	Portugal	Portuguese
S	Sweden	English
SF	Finland	English
ELSE	Other countries	English

If your country does not appear, select ELSE.

3 AUTO SET UP / RF CHANNEL — Press AUTO SET UP/RF CHANNEL.

The auto preset function starts searching for all of the receivable channels and presets them in numerical order.



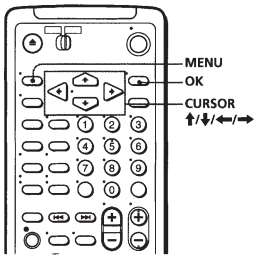
When no more receivable channels can be found, presetting stops and SET UP disappears from the display window.

Notes

- If you use the SMARTLINK connection, the SMARTLINK indicator flashes in the display window during Preset Download operation. Do not exit Auto Set Up during the step 3. If you do, repeat Auto Set Up from the beginning.
- Whenever you operate the Auto Set Up function, some of the settings (ShowView, timer etc..) will be reset. In this case, you have to set them again.

Step 6

Setting the clock



You must set the time and date on the VCR to be able to use the timer recording features properly.

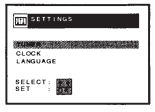
The Auto Clock Set function works only if a station in your area is broadcasting a time signal. If the Auto Set up function did not set the clock correctly for your local area, try another station for the Auto Clock Set function.

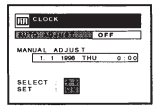
Before you start...

- turn on the VCR and the TV
- set the TV to the video channel..

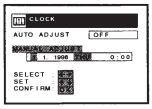
Setting the clock manually

1 • MENU / • CURSOR / • OK — Press MENU, then press CURSOR ↑/↓ to highlight SETTINGS and press OK. Press CURSOR ↑/↓ to highlight CLOCK and press OK.





2 • CURSOR / • OK — Press CURSOR ↑/↓ to highlight MANUAL ADJUST then press OK.



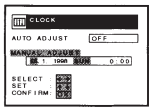
continued

Step 6 : Setting the clock (continued)

3 CURSOR

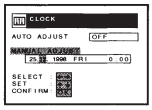
Press CURSOR ↑/↓ to set the date.

The day of the week is set automatically.



4 CURSOR

Press CURSOR → to highlight the month and set the month using CURSOR ↑/↓.

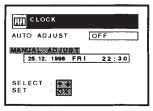


5 CURSOR

Set the year, hour, and minutes in sequence, using CURSOR → to highlight the item to be set, and CURSOR ↑/↓ to select the digits.

6 • OK

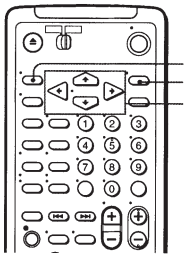
Press OK to confirm the setting and start the clock.



7 • MENU

Press MENU to exit the menu.

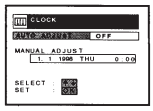
Changing the station for Auto Clock Set



1 • MENU, CURSOR, • OK

Press MENU, then press CURSOR ↑/↓ to highlight SETTINGS and press OK.
Press CURSOR ↑/↓ to highlight CLOCK and press OK.

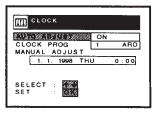
When using the Auto Set Up procedure, skip this step.



2 CURSOR, • OK

Press OK to enter pop up menu and press CURSOR ↑/↓ to set AUTO ADJUST to ON.

Press OK.



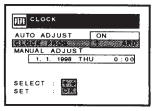
continued

Step 6 : Setting the clock (continued)

3 CURSOR, • OK

Press CURSOR ↓ to highlight CLOCK PROG, then press OK.
Press CURSOR ↑/↓ repeatedly until the programme position of the station that carries the time signal appears.

If the VCR does not receive the time signal from any station, AUTO ADJUST returns to OFF automatically.



4 • MENU

Press MENU to exit the menu.

Tips

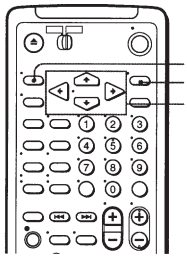
- To change the digits during setting, press CURSOR ← to return to the item to be changed, and select the digits using CURSOR ↑/↓.
- If you set AUTO ADJUST to ON, the Auto Clock Set is activated whenever the VCR is turned off. The date and time is adjusted automatically by making reference to the time signal from the station whose programme position is displayed in the "CLOCK PROG" row.

  If you do not need the Auto Clock Set, set AUTO ADJUST to OFF.

Note

- The menu disappears automatically if you don't proceed for more than a few minutes.

Manual setup — Selecting a language



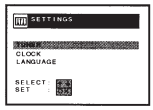
You can change the on-screen display language from the one you selected with the Auto Set Up function.

Before you start...

- turn on the VCR and the TV
- set the TV to the video channel.

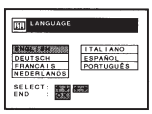
1 • MENU, CURSOR, • OK

Press MENU, then press CURSOR ↑/↓ to highlight SETTINGS and press OK.



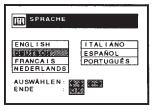
2 CURSOR, • OK

Press CURSOR ↑/↓ to highlight LANGUAGE, then press OK.



3 CURSOR, • OK

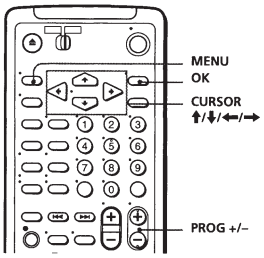
Press CURSOR ↑/↓/←/→ to highlight the desired language, then press OK.



4 • MENU

Press MENU to exit the menu.

Manual setup — Presetting channels



If some channels could not be preset using the Auto Set Up function, you can preset them manually.

Before you start...

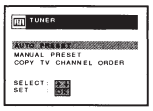
- turn on the VCR and the TV
- set the TV to the video channel.

1 • MENU, • CURSOR, • OK

Press MENU, then press CURSOR ↑/↓ to highlight SETTINGS and press OK.

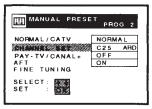
2 • CURSOR, • OK

Press CURSOR ↑/↓ to highlight TUNER and press OK.



3 • CURSOR, • OK

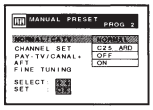
Press CURSOR ↑/↓ to highlight MANUAL PRESET and press OK.



4 • CURSOR, • OK

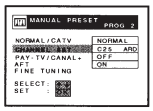
Press CURSOR ↑/↓ to highlight NORMAL/CATV. Press OK.
Press CURSOR ↑/↓ to select NORMAL then press OK.

To preset CATV channels, select CATV.



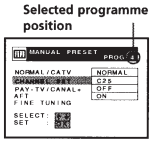
5 • CURSOR

Press CURSOR ↑/↓ to highlight CHANNEL SET.



6 • PROG

Press PROG +/– to select the programme position.



7 • CURSOR, • OK

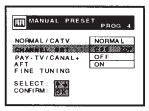
Press OK to highlight the channel number row , then press CURSOR ↑/↓ to start tuning.

The VCR starts searching for a channel and displays the first one it finds on the TV screen. Press CURSOR ↑/↓ repeatedly until the channel you want is displayed.

The channels are scanned in the following order :

- VHF E2 - E12
- Italian channels VHF A- H
- UHF E21 - E69
- CATV S1 - S20
- HYPER S21 - S41
- CATV S01 - S05

If you know the number of the channel you want, press the programme number buttons. For example, for channel 05, first press "0" and then press "5."



8 • OK

Press OK.

continued

Manual setup — Presetting channels (continued)

9 To allocate another channel to another programme position, repeat steps 4 to 8.

10 • MENU Press MENU to exit the menu.

Disabling unwanted programme positions

After tuning the TV channels, you can disable unused programme positions. The disabled positions will be skipped later when you press the PROG +/– buttons. You can also disable unwanted programme positions using the CHANNEL LIST menu (page 31).

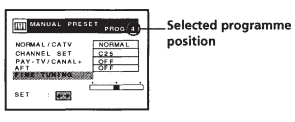
1. In step 7 above, press programme number button "0" twice to display the number "00" beside CHANNEL SET.
2. Press OK to confirm the setting, then press MENU to exit the menu.

If the picture is not clear

Normally, the Auto Fine Tuning (AFT) function automatically tunes in channels clearly. If, however, the picture is not clear, you may also use the manual tuning function.

1. Press PROG +/– to select the programme number for which you cannot obtain a clear picture.
2. Press MENU, then select SETTINGS and press OK.
3. Select TUNER and press OK.
4. Select MANUAL PRESET and press OK.
5. Select FINE TUNING.

The fine tuning meter appears.



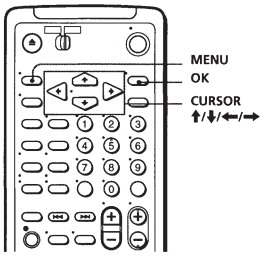
6. Press CURSOR ← / → to get a clearer picture. Press MENU to exit the menu.

   Note that the AFT (Auto Fine Tuning) setting switches to OFF.

Note

- The menu disappears automatically if you don't proceed for more than a few minutes.

Manual setup — Setting station names



You can also set station names as you like. The set station names are displayed on the TV screen when you change the programme position on the VCR.

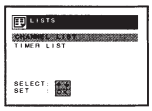
Before you start...

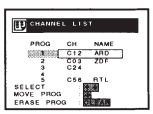
- turn on the VCR and the TV
- set the TV to the video channel.

1 • MENU, • CURSOR, • OK

Press MENU, then press CURSOR ↑/↓ to highlight LISTS then press OK. Press CURSOR ↑/↓ to highlight CHANNEL LIST and press OK.

The preset channels are displayed on the screen. The station names also appear if the VCR detected them in AUTO SET UP.



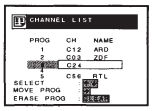


continued

2 CURSOR

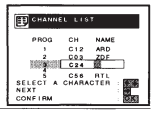
Press CURSOR ↑/↓ to highlight the row on which you want to set the station name.

To display other pages for programme positions 6 to 60, press CURSOR ↑/↓ repeatedly.



3 CURSOR

- If you want to set the station name, press CURSOR ➡ twice to highlight the station name column only.
- If you don't want to set the station name, go to step 6.



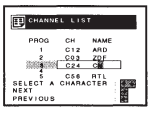
4 CURSOR

Press CURSOR ↑/↓ to select a character.

To set the next character, press CURSOR ➡ to highlight the next space.

If you make a mistake, press CURSOR ⬅ to highlight the character you want to correct, then reset it.

You can set up to five characters for the station name.



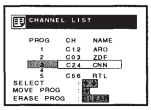
5

To set the station name of another station, repeat steps 2 to 4.

If you want to change the programme positions of the stations, proceed to step 2 of "Manual setup — Changing/disabling programme positions" on page 29.

6 •OK

Press OK to confirm the setting.



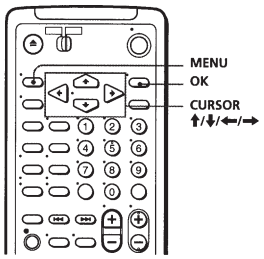
7 •MENU

Press MENU to exit the menu.

Note

- The menu disappears automatically if you don't proceed for more than a few minutes.

Manual setup — Changing/ disabling programme positions



After setting the channels, you can change the programme positions as you like. If any programme positions are unused or contain unwanted channels, you can disable them.

Before you start...

- turn on the VCR and the TV
- set the TV to the video channel.

Changing programme positions

e.g. Moving the programme position from 3 to 1.

1 •MENU, CURSOR, •OK

Press MENU, then press CURSOR ↑/↓ to highlight LISTS and press OK. Press CURSOR ↑/↓ to highlight CHANNEL LIST and press OK.

2 CURSOR

Press CURSOR ↑/↓ to highlight the row on which you want to change the programme position, then press CURSOR ➡.

To display other pages for programme positions 6 to 60, press CURSOR ↑/↓ repeatedly.

continued

3 CURSOR

Press CURSOR ↑/↓ until the selected channel row moves to the desired programme position.

The selected channel is inserted at the new programme position and the intermediate channels are displaced to fill the gap.

4 •OK

Press OK to confirm the setting.

5

To change the programme position of another station, repeat steps 2 to 4.

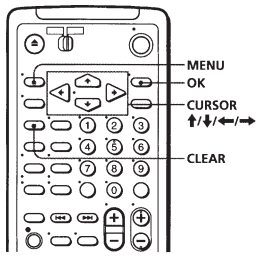
6 •MENU

Press MENU to exit the menu.

Disabling unwanted programme positions

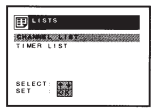
Note

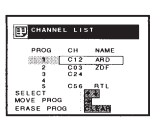
- Be sure to select the programme position you want to disable correctly. If you disable a programme position by mistake, you need to reset that channel manually.



1 •MENU, CURSOR, •OK

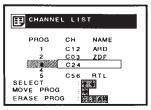
Press MENU, then press CURSOR ↑/↓ to highlight LISTS and press OK. Press CURSOR ↑/↓ to highlight CHANNEL LIST and press OK.





2 CURSOR

Press CURSOR ↑/↓ to highlight the row which you want to disable.



continued

Manual setup — Changing/disabling programme positions (continued)

3 CLEAR

Press CLEAR.

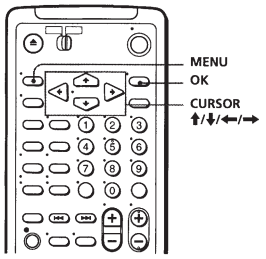
The selected row will be cleared as shown on the right.

4 Repeat steps 2 and 3 for any other programme positions you want to disable.

5 • MENU

Press MENU to exit the menu.

Manual setup — Listing the channels as the TV



You can match the channels for the programme positions preset in the VCR with the ones preset in the connected TV if you have connected the VCR to your TV using the EURO-AV cable.

Before you start...

- turn on the VCR and the TV

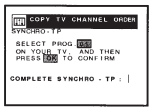
1 • MENU, • CURSOR, • OK

Press MENU, then press CURSOR ↑/↓ to highlight SETTINGS and press OK. Press CURSOR ↑/↓ to highlight TUNER and press OK.

2 • CURSOR

Press CURSOR ↑/↓ to highlight TV CHANNEL ORDER COPY then press OK.

If you use SMARTLINKconnection, you don't need to do the following steps. Listing the channels as the TV will be automatically finished when the normal picture appears.



If you don't use SMARTLINK connection, go to step 3.

3 Select the same programme position on your TV as the one shown on the screen.

continued

Manual setup — Listing the channels as the TV (continued)

4 • OK

Press OK. SYNCHRO-TP (Synchro Tuner Preset) automatically starts searching for the same channel and presets it in the selected programme position.

5 To match other programme positions, repeat steps 3 to 4.

6 • CURSOR

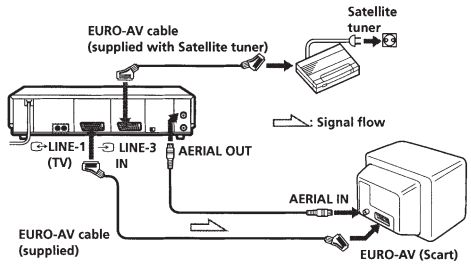
Press CURSOR ➡ to complete SYNCHRO-TP

Notes

- Depending on the TV, some VCR channels may not match the channels preset in the TV. In this case, set the channels manually (see page 24).
- If you don't use a EURO-AV connection, you can not performed Synchro TP.
- Whenever you operate the Auto Set Up function, some of the settings (ShowView, timer etc ...) will be reset. In this case, you have to st them again.
- When you can't list the channels as the TV, try the Auto Set Up function (page 17) first. Then follow the steps above.

Connecting the Satellite tuner

You can connect a Satellite tuner into LINE-3 IN connector .

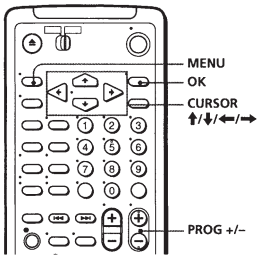


Connecting the Satellite tuner

To watch or record from the Satellite tuner, set your VCR to receive the channels using the on-screen display.

Before you start...

- turn on the VCR and the TV
- set the TV to the video channel.



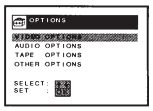
continued

Connecting the Satellite tuner (continued)

1 Turn on your decoder.

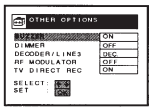
2 • MENU, • CURSOR, • OK

Press MENU, then press CURSOR ↑/↓ to highlight OPTIONS and press OK.



3 • CURSOR, • OK

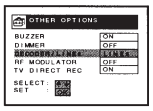
Press CURSOR ↑/↓ to highlight OTHER OPTIONS and press OK.



4 • MENU, • CURSOR, • OK

Press CURSOR ↑/↓ to highlight DECODER/LINE 3. Press OK to enter the pop up menu, press CURSOR ↑/↓ then select LINE3 Press OK.

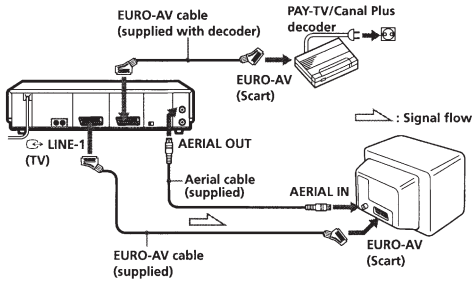
Press MENU to exit the menu.



Setting the PAY-TV/Canal Plus decoder

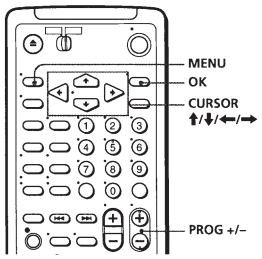
You can watch or record PAY-TV/Canal Plus programmes if you connect a decoder (not supplied) to the VCR.

Connecting a decoder



Setting PAY-TV/Canal Plus channels

To watch or record PAY-TV/Canal Plus programmes, set your VCR to receive the channels using the on-screen display.



Before you start...

- turn on the VCR and the TV
- set the TV to the video channel.

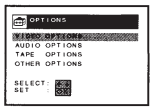
continued

Setting the PAY-TV/Canal Plus decoder (continued)

1 Turn on your decoder.

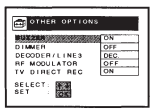
2 • MENU, • CURSOR, • OK

Press MENU, then press CURSOR ↑/↓ to highlight OPTIONS and press OK.



3 • CURSOR, • OK

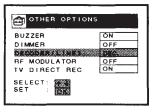
Press CURSOR ↑/↓ to highlight OTHER OPTIONS and press OK.



4 • MENU, • CURSOR, • OK

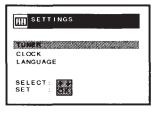
Press CURSOR ↑/↓ to highlight DECODER/LINE 3. Press OK to enter the pop up menu, press CURSOR ↑/↓ then select DEC. Press OK.

Press MENU to exit the menu.



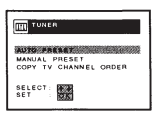
5 • MENU, • CURSOR, • OK

Press MENU, then press CURSOR ↑/↓ to highlight SETTINGS and press OK.



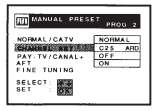
6 • CURSOR, • OK

Press CURSOR ↑/↓ to highlight TUNER and press OK.



7 • CURSOR, • OK

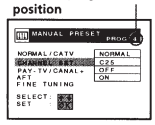
Press CURSOR ↑/↓ to highlight MANUAL PRESET and press OK.



8 • PROG

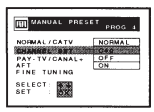
Press PROG +/– to select the desired programme position.

Selected programme position



9 • CURSOR, • OK

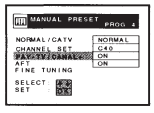
Press OK to enter the channel set box, then press CURSOR ↑/↓ to tune PAY-TV/Canal Plus channels.
When the desired channel is tuned, press OK.



10 • CURSOR, • OK

Press CURSOR ↑/↓ to highlight PAY-TV/CANAL+. Press OK to enter the pop up menu, then press CURSOR ↑/↓ to select ON. Press OK.

If you have set DECODER/LINE3 on LINE3 in OTHER OPTIONS menu, you cannot change PAY-TV/CANAL + option to ON.



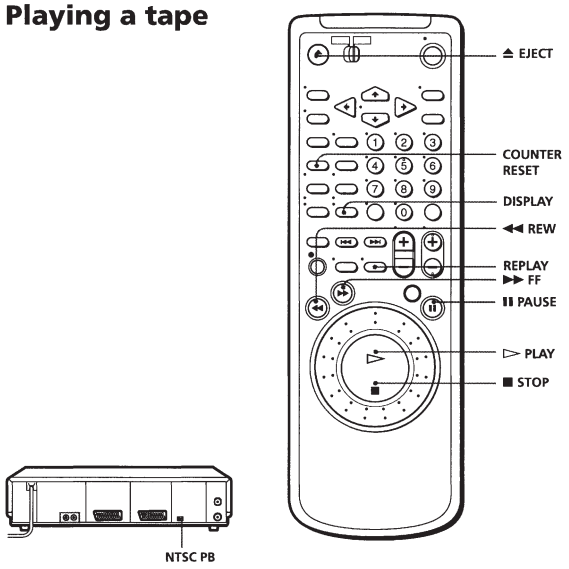
11 • MENU

Press MENU to exit the menu.

Notes

- The menu disappears automatically if you don't proceed more than a few minutes.
- To superimpose subtitles while watching PAY-TV/Canal Plus programmes, make both decoder-VCR and VCR-TV connections using 21-pin EURO-AV cables that are compatible with the RGB signals. You cannot record subtitles on the VCR.
- When you watch PAY-TV/Canal Plus programmes using the RFU input of the TV, press TV/VIDEO so that the VIDEO indicator appears in the display window.

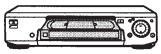
Playing a tape



1 Turn on your TV and set it to the video channel.

2 Insert a tape.

The VCR turns on and starts playing automatically if you insert a tape with its safety tab removed.



3 PLAY ▷

Press ▷ PLAY.

When the tape reaches the end, it will rewind automatically.

Additional tasks

To	Press
Stop play	■ STOP
Pause play	II PAUSE
Resume play after pause	II PAUSE or ▷ PLAY
Search forward	▶▶ FF during playback
Search backward	◀◀ REW during playback
Fast-forward the tape	▶▶ FF during stop
Rewind the tape	◀◀ REW during stop
Eject the tape	⏏ EJECT

To replay a recently watched scene

You can immediately rewind and playback the scene you want to watch again.

During playback, press REPLAY up to four times. The VCR rewinds the tape 10 seconds for each press of the button, and restarts playback.

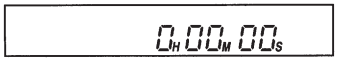
To play an NTSC-recorded tape

Set NTSC PB at the rear of the VCR according to the colour system of your TV.

When your TV is	Set NTSC PB to
PAL only	ON PAL TV
PAL and NTSC	NTSC 4.43

To use the time counter

At the point of the tape that you want to find later, press COUNTER RESET. The counter in the display window resets to "0H00M00S." Search for the point afterwards by referring to the counter.



To display the counter on the TV screen, press DISPLAY.

continued

Playing a tape (continued)

Notes

- Depending on your TV, the following may occur while playing an NTSC-recorded tape:
  - The picture becomes black and white.
  - The picture shakes.
  - No picture appears on the TV screen.
  - Black streaks appear horizontally on the TV screen.
  - The colour density increases or decreases.
- If you play back a tape in LP or EP mode with NTSC system, the sound is heard in monaural.
- The counter resets to "0H00M00S" whenever a tape is reinserted.
- The counter stops counting when it comes to a portion with no recording.

Starting playback automatically with one button (One Touch Play)

If you use the SMARTLINK connection, you can turn on the VCR and the TV, set the TV to the video channel, and start playback automatically with one button.

1 Insert a tape.

The VCR automatically turns on.

If you insert a tape with its safety tab removed, the TV turns on and switches to the video channel. Playback starts automatically.

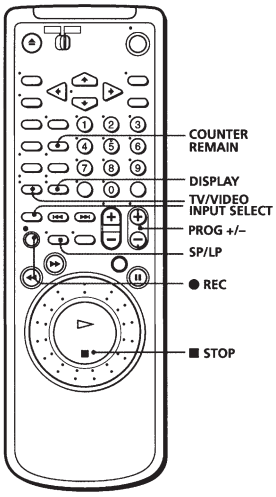
2 Press ▷ PLAY.

The TV turns on and switches to the video channel automatically. Playback starts.

Tip

- When there already is a tape in the VCR, the VCR and the TV turn on, the TV is set to the video channel, and playback starts automatically in one sequence when you press ▷ PLAY.

Recording TV programmes

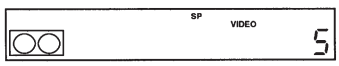


1 Turn on your TV and set it to the video channel.

2 Insert a tape with its safety tab in place.

3 INPUT SELECT

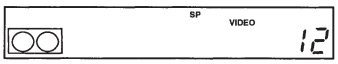
Press INPUT SELECT until a programme position number appears in the display window.



continued

4 • PROG

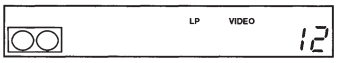
Press PROG +/– to select the programme position you want to record.



5 • SP/LP

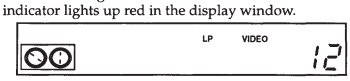
Press SP/LP to select the tape speed, SP or LP.

LP (Long Play) provides recording time twice as long as SP (Standard Play), however, SP produces better picture and audio quality.



6 ● REC

Press ● REC to start recording.
The recording indicator lights up red in the display window.



To stop recording

Press ■ STOP.

To check the remaining tape length

Press DISPLAY. The white bar indicates the approximate length of tape remaining. With the display on, press COUNTER/REMAIN to check the remaining time. Each time you press COUNTER/REMAIN, the time counter and the remaining time appear alternately. The remaining time with the ⊘ indicator also appears in the display window.

Recording what you are watching on the TV (TV DIRECT REC)

If you use the SMARTLINK connection, you can easily record what you are watching on the TV (other than tapes being played on this VCR).

1 Insert a tape with its safety tab in place.

2 Press ● REC while you are watching a TV programme or external source.

The VCR automatically turns on and starts recording what you are watching on the TV.

Tips

- The TV indicator appears in the display window after you press ● REC in some situations such as:
  - when you are watching a source connected to the TV's line input, or
  - when the TV tuner preset data for the programme position is different from the data in the VCR tuner preset.
- If there is a tape with its safety tab in place in the VCR, the VCR automatically turns on and starts recording what you are watching on the TV when you press ● REC.
- You can turn the TV DIRECT REC function on and off in the OTHER OPTIONS menu of the OPTIONS menu (see page 66).

Notes

- You cannot record what you are watching using this method when the VCR is in the following modes: pause, timer standby, tuner preset, Auto Set Up, and recording.
- When the TV indicator is lit in the display window, do not turn off the TV nor change the TV programme position. When the TV indicator is not lit, the VCR continues recording the programme even if you change the TV programme position on the TV.

In order to get an accurate remaining time indication, be sure the TAPE SELECT item in TAPE OPTIONS menu is set according to the tape type you use (see page 65).

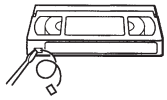
To watch another TV programme while recording

1 Press TV/VIDEO on the remote commander to turn off the VIDEO indicator in the display window.

2 Select another programme position on the TV.

To save a recording

To prevent accidental erasure, break off the safety tab as illustrated. To record on a tape again, cover the tab hole with adhesive tape.



Safety tab

Tips

- To select a programme position, you can use the programme number buttons on the remote commander. For two-digit numbers, press the –/-- (ten's digit) button followed by the programme number buttons.
- You can select a video source from the LINE-1 (TV) or LINE-3 IN (Scart) connector, or the LINE-2 IN jacks using INPUT SELECT.
- The display appears on the TV screen indicating information about the tape, but the information won't be recorded on the tape.
- If you don't want to watch TV while recording, you can turn off the TV.

Notes

- The display does not appear during still (pause) mode or slow-motion playback.
- The display will not appear while playing an NTSC-recorded tape.
- If a tape has portions recorded in both PAL and NTSC systems, the time counter reading will not be correct. This discrepancy is due to the difference between the counting cycles of the two video systems.
- You cannot watch PAY-TV/Canal Plus programme while recording another PAY-TV/Canal Plus programme.
- When you insert a tape with a short tape length such as E-30 or a non-standard commercially available tape, the remaining tape counter may not be correct.
- The remaining tape counter doesn't work for an NTSC-recorded tape. "–:– –" appears in the display window.
- The remaining tape counter is intended for rough measurement only.
- The remaining time will be displayed only about 30 seconds after the tape is inserted.

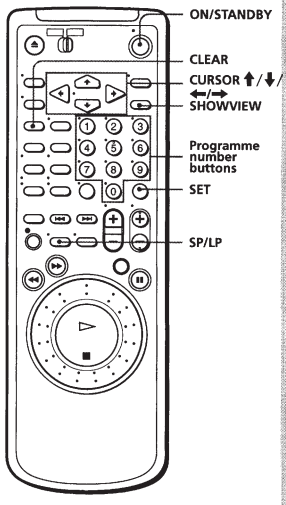
continued

Recording TV programmes using ShowView

Just enter the programme's ShowView number listed in the TV programme guide. The date, times, and programme position of that programme are set automatically. You can preset up to eight programmes at a time.

Before you start...

- Check that the VCR clock is set to the correct time and date (see page 19).
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.
- If you don't use the SMARTLINK connection, turn on your TV and set it to the video channel.
- If you use the SMARTLINK connection, go to step 1.



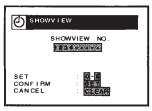
1 SHOWVIEW

Press SHOWVIEW.

continued

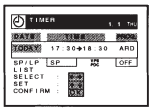
2 Press the programme number buttons to enter the programme's ShowView code.

If you make a mistake press CLEAR and re-enter the correct number.



3 Press SET.

The date, start and stop times, programme position, and tape speed appear on the TV screen.



If "- -" appears in the programme column (this may happen for local broadcasts), you have to set the appropriate programme position manually. Press CURSOR ↑/↓ to select the desired programme position. You will only have to do this operation once for the referred channel. The VCR will then store your setting. If you want to record a satellite broadcast, select the LINE on which your satellite tuner is connected (see page 35).

If you want to change the date, time, tape speed, and the VPS/PDC function setting:

1 Press CURSOR ←/→ to highlight the item you want to change.

2 Press CURSOR ↑/↓ to reset it.

- to record the same programme every day or the same day every week, see "Daily/weekly recording" on page 49.
- to use the VPS/PDC function, set VPS/PDC to ON. For details of the VPS/PDC function, see "Timer recording with VPS/PDC signals" on page 49.

4 Press OK to confirm the setting.

5 Press ON/STANDBY to turn off the VCR.

The ⏲ indicator (TIMER) appears in the display window and the VCR stands by for recording.

To stop recording

To stop the VCR while recording, press ■ STOP.

Daily/weekly recording

In step 2 above, press CURSOR ↓ to select the recording pattern. Each time you press CURSOR ↓, the indication changes as shown below. Press CURSOR ↑ to change the indication in reverse order.

TODAY → SUN-SAT (Sunday to Saturday) → MON-SAT (Monday to Saturday) → MON-FRI (Monday to Friday) → SAT (every Saturday) ..... → MON (every Monday) → SUN (every Sunday) → 1 month later →(dates count down) → TOMORROW →TODAY

Timer recording with VPS/PDC signals

Some broadcast systems transmit VPS (Video Programme System)/PDC (Programme Delivery Control) signals with their TV programmes. These signals ensure that your timer recordings are made regardless of broadcast delay, early starts or broadcast interruptions.

In step 3 above, press CURSOR ↑/↓ to turn on/off the VPS/PDC indication after you set the recording date. If you do not want to set the VPS/PDC function, turn off the VPS/PDC indication.

When you have selected A (Austria), D (Germany) or CH (Switzerland) by the country selection in the Auto Set Up procedure, VPS/PDC function is automatically set to ON.

You can also use the VPS/PDC function for a source connected to the LINE-1 (TV) and LINE-3 IN connectors, and LINE-2 IN jacks.

Tips

- For two digit numbers, press the -/-- (ten digit) button followed by the programme number button.
- To set the programme position, you can also use the PROG +/– or programme number buttons.
- To set the tape speed, you can also use SP/LP.
- To set the start and stop times, you can also use programme number buttons.

Notes

- When setting the timer with VPS/PDC signals, enter the start and stop times exactly as indicated in the TV programme guide, otherwise the VPS/PDC function won't work.
- If the VPS/PDC signal is too weak or the broadcasting station failed to transmit VPS/PDC signals, the VCR will start recording at the set time without using the VPS/PDC function.
- ⏲ indicator flashes in the display window when you press ON/STANDBY with no tape inserted.

continued

To use the VCR after setting the timer

To use the VCR before a timer recording begins, just press ON/STANDBY. The ⏲ indicator (TIMER) turns off and the VCR switches on. Remember to press ON/STANDBY to reset the VCR after using the VCR.

You can also do the following tasks while the VCR is recording:

- Reset the counter.
- Display tape information on the TV screen.
- Check the timer settings.
- Watch another TV programme.

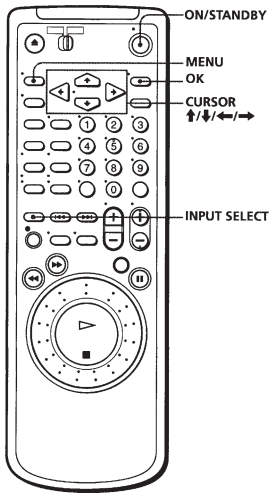
Tips

- To cancel the "Recording TV programmes using ShowView" procedure, press SHOWVIEW before pressing SET.
- In step 4 above, you can check the TIMER LIST by selecting LIST and pressing OK. Press OK again to return to the former screen.
- When you are recording a programme in the SP mode and the remaining tape becomes shorter than the recording time, the tape speed is automatically changed to the LP mode. Note that some interference will appear on the picture at the point the tape speed is changed. If you want to keep the same tape speed, set AUTO LONG PLAY to OFF in the TAPE OPTIONS menu (see page 65).

Note

- If the VCR beeps repeatedly, this means that the programme's ShowView number is incorrect.

Setting the timer manually



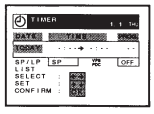
If ShowView is not available in your area, follow the instructions below to set the timer to record programmes.

Before you start...

- Check that the VCR clock is set to the correct time.
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.
- If you don't use the SMARTLINK connection, turn on your TV and set it to the video channel.

1 Press MENU.

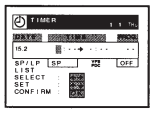
Press CURSOR ↑/↓ to highlight TIMER, then press OK.



continued

2 CURSOR

Set the date, start and stop times, programme position, tape speed and the VPS/PDC function:



1 Press CURSOR ➡ to highlight each item in turn.
2 Press CURSOR ⬆/⬇ to set each item.

To correct a setting, press CURSOR ⬅ to reset.

- To record the same programme every day or the same day every week, see "Daily/weekly recording" on page 53.
- If you don't want to use the VPS/PDC function, see "Timer recording with VPS/PDC signals" on page 49.

INPUT SELECT

- To record from other sources connected to the LINE-1 (TV) or LINE-3 IN (Scart) connector, or LINE-2 IN jacks, press INPUT SELECT to display "L1," "L3," or "L2" in the "PROG" position.

3 OK

Press OK to confirm the setting.

4 ON/STANDBY

Press ON/STANDBY to turn off the VCR.

The ⏲ indicator appears in the display window and the VCR stands by for recording.

To record from other sources, leave the connected equipment switched on.

To stop recording

To stop the VCR while recording, press ■ STOP.

Daily/weekly recording

In step 2 above, press CURSOR ⬇ to select the recording pattern. Each time you press CURSOR ⬇, the indication changes as shown below. Press CURSOR ⬆ to change the indication in reverse order.

TODAY → SUN-SAT (Sunday to Saturday) → MON-SAT (Monday to Saturday) → MON-FRI (Monday to Friday) → SAT (every Saturday) ..... → MON (every Monday) → SUN (every Sunday) → 1 month later →(dates count down) → TOMORROW →TODAY

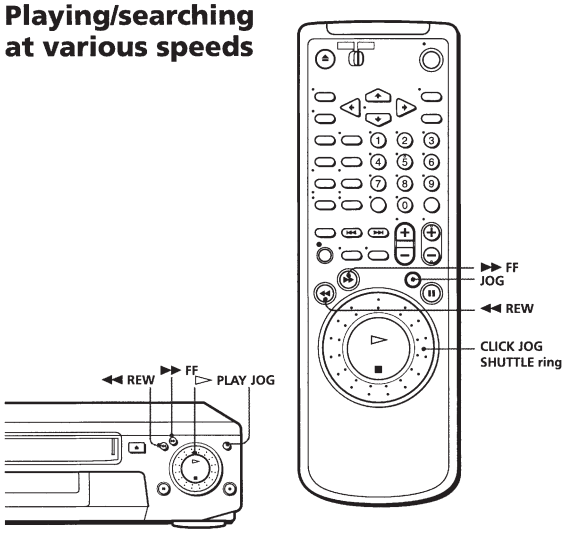
Tips

- To set the programme position, you can also use the PROG +/– or programme number buttons.
- To set the tape speed, you can also use SP/LP.
- In step 2 above, you can check the TIMER LIST by selecting LIST and pressing OK. Press OK again to return to the former screen.
- When you are recording a programme in the SP mode and the remaining tape becomes shorter than the recording time, the tape speed is automatically changed to the LP mode. Note that some interference will appear on the picture at the point the tape speed is changed. If you want to keep the same tape speed, set AUTO LONG PLAY to OFF in the TAPE OPTIONS menu (see page 65).

Note

- ⏲ indicator flashes in the display window when you press ON/STANDBY with no tape inserted.

Playing/searching at various speeds



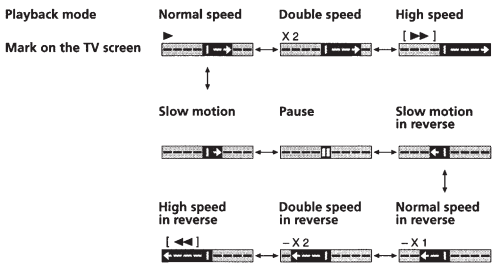
Playback options	Operation
Fast-forward/rewind	During stop, press ▶▶ FF or ◀◀ REW.
View the picture during fast-forward or rewind	During fast-forward, hold ▶▶ FF down. During rewind, hold ◀◀ REW down.
Rewind and start play	During stop, hold ◀◀ REW down on the VCR, and press ▷ PLAY on the VCR then release both.

Using the CLICK JOG SHUTTLE ring

With the CLICK JOG SHUTTLE ring, you can operate a variety of playback options.
There are two ways for using the CLICK JOG SHUTTLE ring, normal mode (CLICK JOG SHUTTLE ring) and jog mode (CLICK JOG ring) .

To use the CLICK JOG SHUTTLE ring in normal mode

During playback or pause, turn the CLICK JOG SHUTTLE ring clockwise or anticlockwise. Each change in the CLICK JOG SHUTTLE ring position changes the playback mode, and the corresponding mark appears on the TV screen for a few seconds in the following way if the on-screen display function is on:



To use the CLICK JOG SHUTTLE ring in jog mode

Use this mode for frame-by-frame playback.
Press JOG to enter the jog mode. The JOG indicator lights up. If you change to the jog mode during any playback mode, the playback pauses so you can see a still picture. Each change in the CLICK JOG ring position shifts the picture one frame. To shift frames in reverse, turn the CLICK JOG ring anticlockwise.
The frame shift speed depends on the speed you turn the CLICK JOG ring.
To resume normal mode, press JOG again. The JOG indicator goes off.

continued

Playing/searching at various speeds (continued)

To resume normal playback

Press ▷ PLAY.

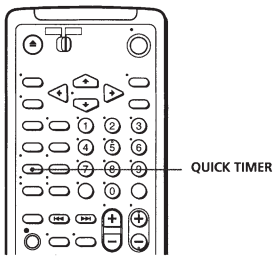
Tip

- Adjust the picture using TRACKING +/– if:
  – Streaks appear while playing in slow motion.
  – Bands appear at the top or bottom while pausing.
  – The picture shakes while pausing.

Notes

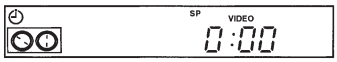
- The playback sound is muted during the operations in the above table.
- In the LP mode, noise may appear or there may be no colour.
- If the playback mode mark doesn't appear on the TV screen, press DISPLAY.

Recording TV programmes using the quick timer



After starting recording in the normal way, you can have the VCR stop recording automatically after a specified duration.

1 While recording, press QUICK TIMER once.
The ◴ indicator appears in the display window.



2 Press QUICK TIMER repeatedly to set the duration.
Each press advances the time in increments of 30 minutes.

0:00 → 0:30 → 1:00 ----→ 10:30 → 11:00

The duration decreases minute by minute to 0:00, then the VCR stops recording and turns off automatically.

To extend the duration

Press QUICK TIMER repeatedly to set to the new duration.

To stop recording

To stop the VCR while recording, press ■ STOP.

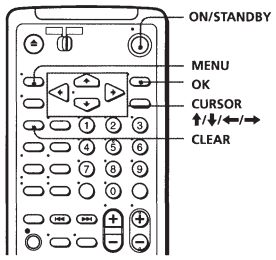
Using the quick timer during stop mode

1 Press QUICK TIMER.
2 Press PROG +/– or INPUT SELECT to select the programme position you want to record.
3 Press QUICK TIMER repeatedly to set the recording duration.
The recording starts.

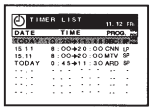
Checking/ changing/ cancelling timer settings

Before you start...

- Turn on your TV and set it to the video channel.



1 Press ON/STANDBY to turn on the VCR.
2 Press MENU, and highlight LIST, then select TIMER LIST and press OK:



- If you want to change or cancel a setting, go on to the next step.
- If you do not need to change or cancel the settings, press MENU, then turn off the VCR to return to recording standby.

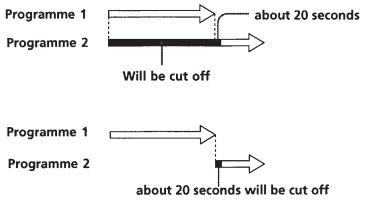
3 Press CURSOR ↑/↓ to select the setting you want to change or cancel,
- If you want to cancel the setting, press CLEAR and skip the next step. Press MENU to exit menu.
- If you want to change the setting, press OK.

4 The selected item appears in the TIMER menu.
- To change the setting, press CURSOR ←/→ to highlight the item you want to change, and press CURSOR ↑/↓ to reset it. To cancel the VPS/PDC function, set VPS/PDC to OFF.

5 Press OK to set the timer.
If any settings remain, turn off the VCR to return to recording standby.

When the timer settings overlap

The programme that starts first has priority and the second programme starts recording only after the first programme has finished. If the programmes start at the same time, the programme listed first in the menu has priority.



Tip

- In step 5 above, you can check the TIMER LIST by selecting LISTS and pressing OK. Press MENU to exit the TIMER LIST.

Recording stereo and bilingual programmes

In ZWEITON (German stereo) system

This VCR automatically receives and records stereo and bilingual programmes based on the ZWEITON system. When a stereo or bilingual programme is received, the STEREO indicator appears in the display window.

To select bilingual sound while recording

Press AUDIO MONITOR to select the sound you want.

To listen to	On-screen display	Display window
Main	MAIN	STEREO
Sub	SUB	STEREO
Main and sub	MAIN/SUB	STEREO

In NICAM system (SLV-E830NP only)

This VCR receives and records stereo and bilingual programmes based on the NICAM system (the NICAM indicator appears). When a stereo or bilingual programme is received, the STEREO indicator appears in the display window.

To record a NICAM programme, HIFI AUDIO in the AUDIO OPTIONS should be set to NICAM (initial setting). To check the menu setting, see page 65 for details.

To select the sound while recording

Press AUDIO MONITOR to select the sound you want.

Stereo programme

To listen to	On-screen display	Display window
Stereo	STEREO	STEREO
Standard sound*	No indicator	No indicator

* Usually the mixed sound of left and right channels (monaural)

Bilingual programme

To listen to	On-screen display	Display window
Main	MAIN	STEREO
Sub	SUB	STEREO
Main and sub	MAIN/SUB	STEREO
Standard sound*	No indicator	No indicator

* Usually the main sound (monaural)

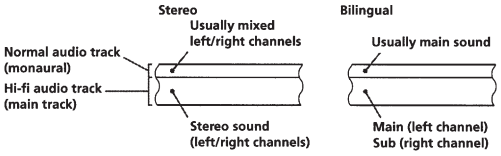
Selecting the sound during playback

Press AUDIO MONITOR to select the sound you want.

To listen to	On-screen display	Display window
Stereo/main and sub (left and right channels)	STEREO	STEREO
Left channel/main	LCH	STEREO
Right channel/sub	RCH	STEREO
Standard sound	No indicator	No indicator

How sound is recorded on a video tape

The VCR records sound onto two separate tracks. Hi-fi audio is recorded onto the main track along with the picture. Monaural sound is recorded onto the normal audio track along the edge of the tape.

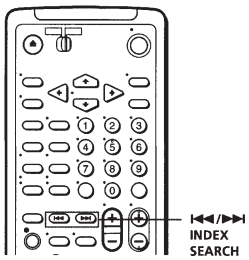


Notes

- To listen to playback sounds in stereo, you must use the EURO-AV or AUDIO OUT connections.
- When you play a tape recorded in monaural, the sound is heard in monaural regardless of the AUDIO MONITOR setting.
- If the AUDIO MONITOR button does not function, check that AUDIO MIX in the AUDIO OPTIONS is set to OFF.
- If HIFI AUDIO is set to STD, the standard sound will be recorded on both the hi-fi and normal audio tracks. Pressing AUDIO MONITOR will not change the sound (SLV-E830 NP only).

Searching using the index function

The VCR marks the tape with an index signal at the point where each recording begins. Use these signals as references to find a specific recording. The VCR can search up to 99 index signals ahead of or behind the current position.

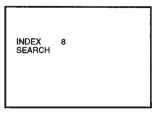


1 Insert an indexed tape into the VCR.

2 Press I◄◄ /►►I INDEX SEARCH repeatedly to specify how many index signals ahead or behind you want to search:

- To search ahead, press ►►I INDEX SEARCH.
- To search backwards, press I◄◄ INDEX SEARCH.

The VCR starts searching and the index number on the TV screen counts down to zero. Playback starts automatically from that point.



To stop searching

Press ■ STOP.

Note

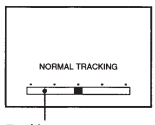
- No index signal will be added when recording starts from recording pause. However, an index signal will be marked if you change the programme position during recording pause.

Adjusting the picture

Adjusting the tracking

Although the VCR automatically adjusts the tracking when playing a tape (the tracking indicator flashes in the display window, then goes off), distortion may occur if the tape was recorded in poor condition. If so, manually adjust the tracking.

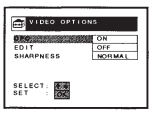
Press TRACKING +/– to display the tracking meter. The distortion should disappear as you press one of the two buttons (the indicator lights up). To resume automatic tracking adjustments, eject the tape and reinsert it or press TRACKING + and TRACKING – at the same time, so that the tracking meter comes back to the center.



Tracking meter

About Optimum Picture Control (OPC)

Optimum Picture Control (OPC) automatically improves recording and playback quality by adjusting the VCR to the condition of the video heads and tape. To maintain better picture quality, we recommend that you set OPC to ON in the VIDEO OPTIONS menu (with the OPC indicator in the display window lit). For details, see page 64.



OPC playback

The OPC function automatically works on all types of tapes, including rental tapes and tapes that were not recorded with OPC.

OPC recording

Whenever you insert a tape and start recording for the first time, the VCR adjusts to the tape using the OPC function (the OPC indicator flashes rapidly). This adjustment is retained until the tape is ejected.

To deactivate the OPC

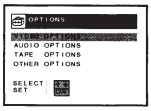
Press MENU and highlight OPTIONS, then VIDEO OPTIONS and set OPC to OFF. The OPC indicator in the display window goes off.

Notes

- You can adjust the tracking for the NTSC-recorded tape but the tracking meter won't be displayed.
- There is a delay of a few seconds before the VCR actually starts recording while the VCR analyses the tape. To avoid the delay, first set the VCR to recording pause (the OPC indicator flashes slowly) and press ● REC to have the VCR analyse the tape (the OPC indicator flashes rapidly). After the OPC indicator stops flashing, press ❚❚ PAUSE to start recording immediately. If you want to start recording quickly without using the OPC function, first set the VCR to recording pause (the OPC indicator flashes slowly) and press ❚❚ PAUSE to start recording.

Changing options

1 Press MENU, then select OPTIONS.



2 Press CURSOR ↑/↓ to highlight the kind of option to change, VIDEO OPTIONS, AUDIO OPTIONS, TAPE OPTIONS or OTHER OPTIONS then press OK.

3 Press CURSOR ↑/↓ to select the option to change, then press OK to enter the pop up menu.

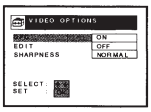
4 Press CURSOR ↑/↓ to select the desired setting, then press OK to confirm it.

5 Press MENU to exit the menu.

Menu choices

Initial settings are indicated in bold print.

VIDEO OPTIONS menu



Menu option	Set this option to
OPC	• **ON** to switch on the OPC (Optimum Picture Control) function and improve picture quality. • OFF to switch off OPC. For details, see page 63.
EDIT	• ON to minimize picture deterioration when editing. • **OFF** to turn off EDIT. For details, see page 68.
SHARPNESS	• LOW to playback a poorly quality tape. • **NORMAL** to playback an average quality tape. • HIGH to playback a good quality tape.

Note

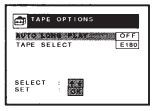
- During the EDIT procedure, the VCR wil perform an analyse of the tape (the OPC indicator blinks in the display window) but will not start recording with the OPC function.

AUDIO OPTIONS menu

SLV-E830NP

Menu option	Set this option to
AUDIO MIX	• ON to listen to the hi-fi and normal audio tracks at the same time. The AUDIO MONITOR button will not function. • **OFF** to listen to the hi-fi and normal audio tracks separately. Select the sound using the AUDIO MONITOR button. For details, see page 60.
HIFI AUDIO (only for SLV-E830NP)	• STD to record standard sound on the hi-fi audio track. • **NICAM** to record NICAM broadcasts on the hi-fi audio track. For details, see page 60.

TAPE OPTIONS menu

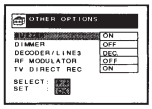


Menu option	Set this option to
AUTO LONG PLAY	• ON to automatically record from SP (Standard Play) to LP (Long Play)when the tape lenght is not long enough. • **OFF** to normally record in SP (Standard Play). For details, see page 50.
TAPE SELECT	• **E180** to use an E-180 or shorter tape type. • E-195 to use an E-195. • E240 to use an E-240. • E300 to use an E-300. For details, see page 45.

continued

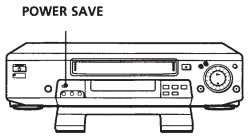
Changing options (continued)

OTHER OPTIONS menu



Menu option	Set this option to
BUZZER	• **ON** to output a beep sound when any illogical operation is made. • OFF to deactivate it.
DIMMER	• ON to make the display window dim. • **OFF** to make it brighter.
DECODER/LINE 3	• **DEC.** to use the LINE-3 IN connector as the Canal Plus decoder connector. • LINE3 to use the LINE-3 IN connector as the line input connector.
RF MODULATOR	• ON if you connect the VCR to your TV using only the aerial cable. • **OFF** if you connect the VCR to your TV using only the EURO-AV cable.
TV DIRECT REC	• **ON** to activate the TV DIRECT REC function. • OFF to deactivate it.

POWER SAVE switch



The Power Save switch has the function of activating (OFF) and/or deactivating (ON) the indicators in the display window while the VCR is standing by, to conserve the VCR power.

You can decrease the power consumption in standby mode to less than 4 W if you have set DECODER /LINE 3 to LINE 3 in OTHER OPTIONS menu (see page 36). If so, you will not be able to watch PAY-TV/C+ on your TV when VCR is in standby mode.

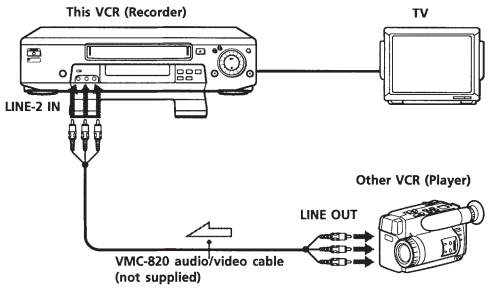
Note

- When you set a timer recording, the indicators in the display window are on even though POWER SAVE is set to ON.

Editing

Connecting to a VCR or stereo system

How to connect to record on this VCR



Tip

- You can also use the LINE-1 (TV) or LINE-3 IN connector instead.

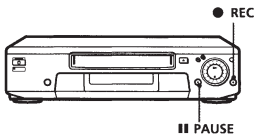
Notes

- Make sure you connect the plugs to jacks of the same colour.
- If the other VCR is a monaural type, leave the red plugs unconnected.
- If you connect this VCR to both the LINE IN and LINE OUT jacks of the other VCR, select the input correctly to prevent a humming noise.

How to connect to a stereo system

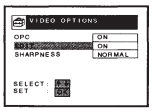
Connect the LINE-2 IN AUDIO L/R jacks on this VCR to the audio output jacks on the stereo system, using the RK-C510KS audio cable (not supplied).

Basic editing
(when recording on this VCR)



Before you start editing

- Turn on your TV and set it to the video channel.
- Press INPUT SELECT to display "L2" (or "L3") in the display window.
- Press SP/LP to select the tape speed, SP or LP.
- On this VCR, set EDIT to ON in VIDEO OPTIONS menu to display "EDIT" in the display window. If the other VCR has a similar feature, activate this one as well.



1 Insert a source tape with its safety tab removed into the other (playback) VCR. Search for the point to start playback and set it to playback pause.

2 Insert a tape with its safety tab in place into this (recording) VCR.
Search for the point to start recording and press II PAUSE.

3 Press ● REC on this VCR to set it to recording pause.

4 To start editing, press the II PAUSE buttons on both VCRs at the same time.

To stop editing

Press the ■ STOP buttons on both VCRs.

Tip

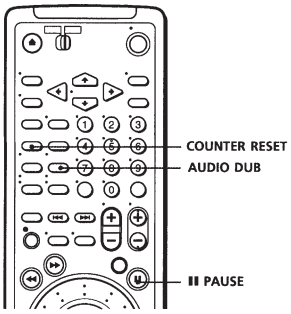
- To cut out unwanted scenes while editing, press II PAUSE on this VCR when an unwanted scene begins. When it ends, press II PAUSE again to resume recording (Assemble Editing).

Note

- If you start editing following the procedure above, the VCR won't start recording with the OPC function. To record a tape with the OPC function, press ● REC again during recording pause in step 3 so the VCR analyses the tape. Then, when you start editing in step 4, press II PAUSE after the OPC indicator stops flashing. If you press II PAUSE before the OPC indicator stops flashing, the OPC function is cancelled

Audio dubbing

This feature lets you record over the normal audio track. The monaural sound previously recorded is replaced while the original hi-fi sound remains unchanged. Use this feature to add commentary to a tape that you have recorded with a camcorder.



Before you start dubbing

- Turn on your TV and set it to the video channel.
- Press INPUT SELECT to display "L2" in the display window.

1 Insert a source tape into the stereo system (or the playback VCR). Search for the point to start playback and set it to playback pause.

2 Insert a prerecorded tape with its safety tab in place into this (recording) VCR. Search for the end of the section to be replaced and press II PAUSE.

3 Press COUNTER RESET on this VCR to reset the counter to "0H00M00S."

4 Rewind the prerecorded tape to the beginning of the section to be replaced.
The VCR enters pause mode.

5 Press AUDIO DUB.
The audio dubbing indicator ⊖ appears in the display window.

6 To start editing, press the II PAUSE buttons on this VCR and the stereo system (or other VCR) at the same time.
When the counter reaches "0H00M00S," audio dubbing stops automatically.

To stop while editing

Press the ■ STOP buttons on this VCR and the stereo system (or other VCR).

Note

- After you use this feature, the audio in playback mode is automatically set to monaural.

continued

Audio dubbing (continued)

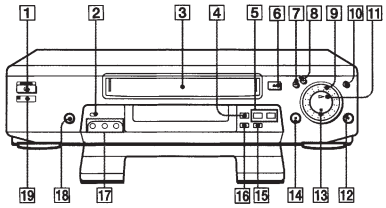
To listen to both the hi-fi and normal audio

Set AUDIO MIX to ON in the AUDIO OPTIONS menu (page #65). Use this feature to listen to dubbed audio over the original hi-fi audio. When AUDIO MIX is set to ON, the AUDIO MONITOR button does not function. Remember to reset AUDIO MIX to OFF after playing the tape.

Index to parts and controls

Refer to the pages indicated in parentheses ( ) for details.

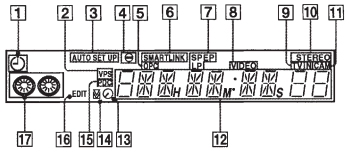
Front panel



1 ON/STANDBY switch/indicator (15)
2 POWER SAVE switch (66)
3 Tape compartment
4 AUTO SET UP/RF CHANNEL button (15)
5 PROGRAM -/+ buttons TRACKING (15, 16)
6 ⏏ EJECT button (41)
7 ◀◀ REW button (41, 54)
8 ▶▶ FF button (41, 54)
9 CLICK JOG SHUTTLE ring (54)
10 JOG indicator (54)
11 ▷ PLAY button (41, 54)
12 ● REC button (68)
13 ■ STOP button (68)
14 II PAUSE button (68)
15 AUDIO DUB button (69)
16 QUICK TIMER button (57)
17 LINE-2 IN VIDEO/AUDIO L/R jacks (67)
18 Drop down panel opening button (15)
19 Remote sensor (5)

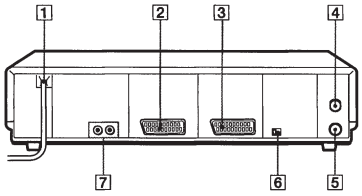
continued

Display window



1 TIMER indicator (48)
2 VPS indicator (49)
3 AUTO SET UP/RF CHANNEL indicator (15, 18)
4 ⊖ (audio dubbing) indicator (69)
5 OPC indicator (63)
6 SMARTLINK indicator (12)
7 Tape speed indicators (44)
8 VIDEO indicator (44)
9 TV indicator (46)
10 STEREO indicator (60)
11 NICAM indicator (SLV-E830NP only) (60)
12 Line/programme position indicator/time counter/clock (15, 41, 43)
13 ◴ (remaining time) indicator (44)
14 (tracking) indicator (63)
15 PDC indicator (49)
16 EDIT indicator (68)
17 Tape/Recording indicator (44)

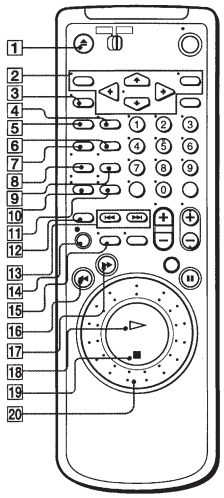
Rear panel



1 Mains lead (10, 13)
2 LINE-1 (TV)
LIGNE-1 connector (10, 35, 36)
3 LINE-3 IN
ENTREE LIGNE-3 connector (35)
4 AERIAL OUT
ANTENNE SORTIE connector (10, 13)
5 AERIAL IN
ANTENNE ENTREE connector (10, 13)
6 NTSC PB switch (40)
7 AUDIO OUT R/L
SORTIE AUDIO D/G jacks (14)

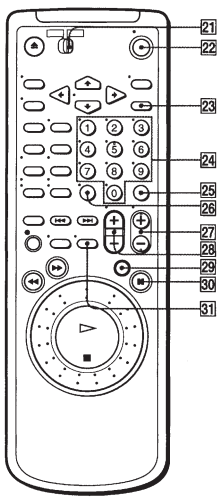
continued

Remote commander



1 ⏏ EJECT button (40)
2 Menu buttons (19)
MENU button
CURSOR ↑/↓/←/→ buttons
OK button
3 WIDE button (for TV) (6)
4 AUDIO MONITOR button (6, 60)
5 CLEAR button (31, 48, 58)
6 COUNTER/REMAIN button* (44)
7 COUNTER RESET button* (41, 69)
8 QUICK TIMER button* (57)
9 AUDIO DUB button* (69)
10 TV/VIDEO button (45)
11 DISPLAY button (6, 44)
12 INPUT SELECT button (43, 51)
13 ⏮/⏭ INDEX SEARCH buttons (62)
14 ● REC button (44)
15 SP/LP button (44)
▭ TV power on/TV mode select button (for TV) (6)
16 ◀◀ REW button (41, 54)
17 ▶▶ FF button (41, 54)
18 ▷ PLAY button (40)
19 ■ STOP button (41)
20 CLICK JOG SHUTTLE ring (55)

* FASTEXT buttons (for TV)

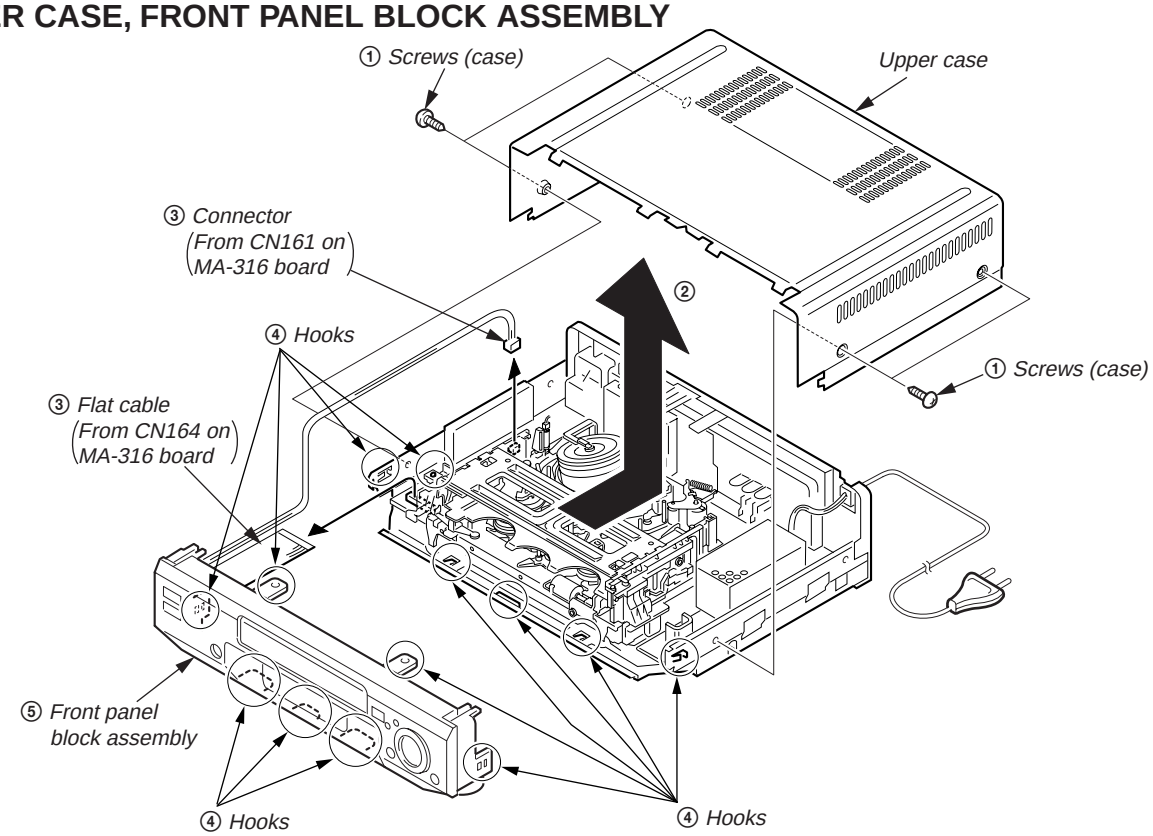


21 TV/VIDEO remote control switch (5, 6)
22 ON/STANDBY button (6)
23 SHOWVIEW button (47)
24 Programme number buttons (6)
25 SET button (48)
26 -/-- (ten's digit) button (45)
27 PROG (programme) +/– buttons (6, 25, 45, 47)
▲/▼ Teletext page access buttons (for TV) (6)
28 VOL (volume) +/– buttons (for TV) (6)
29 JOG button/indicator (54)
30 ❚❚ PAUSE button (41, 69)
31 REPLAY button (41)
▤ (Teletext) button (for TV) (6)

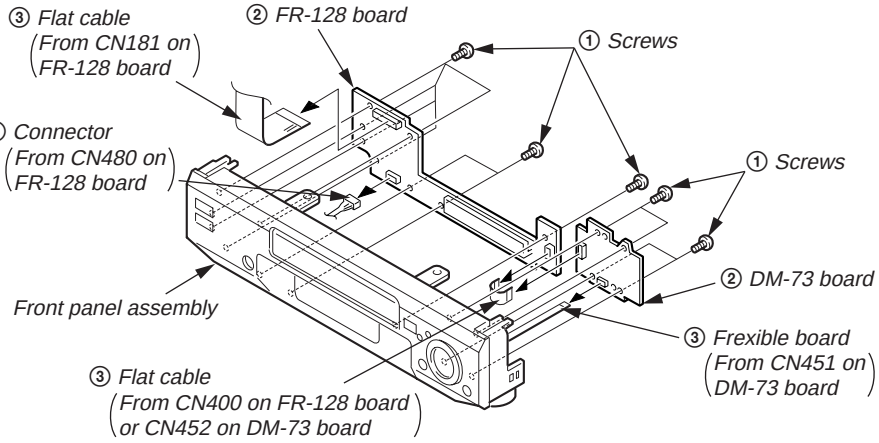
SECTION 2
DISASSEMBLY

NOTE : Follow the disassembly procedure in the numerical order given.

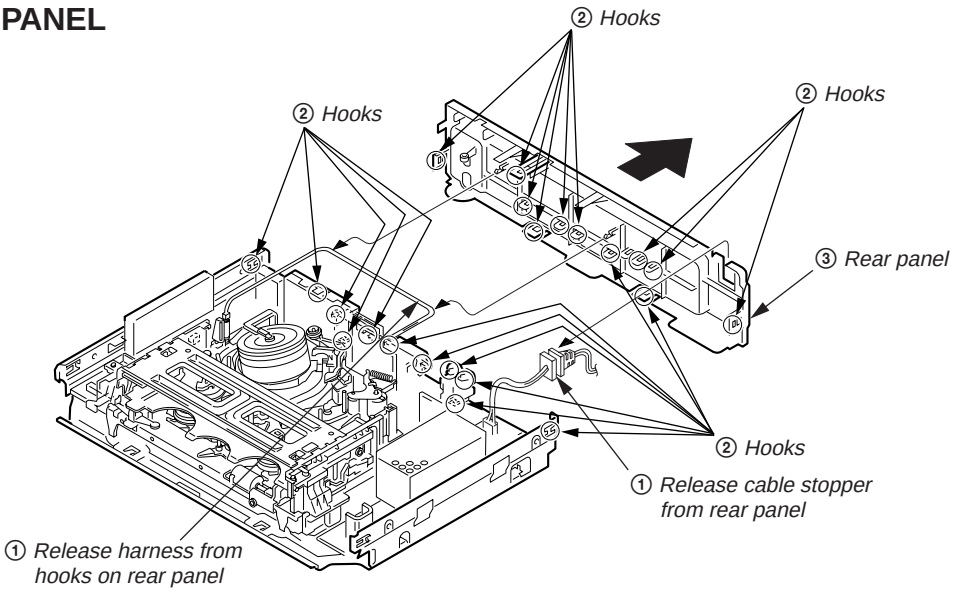
2-1. UPPER CASE, FRONT PANEL BLOCK ASSEMBLY



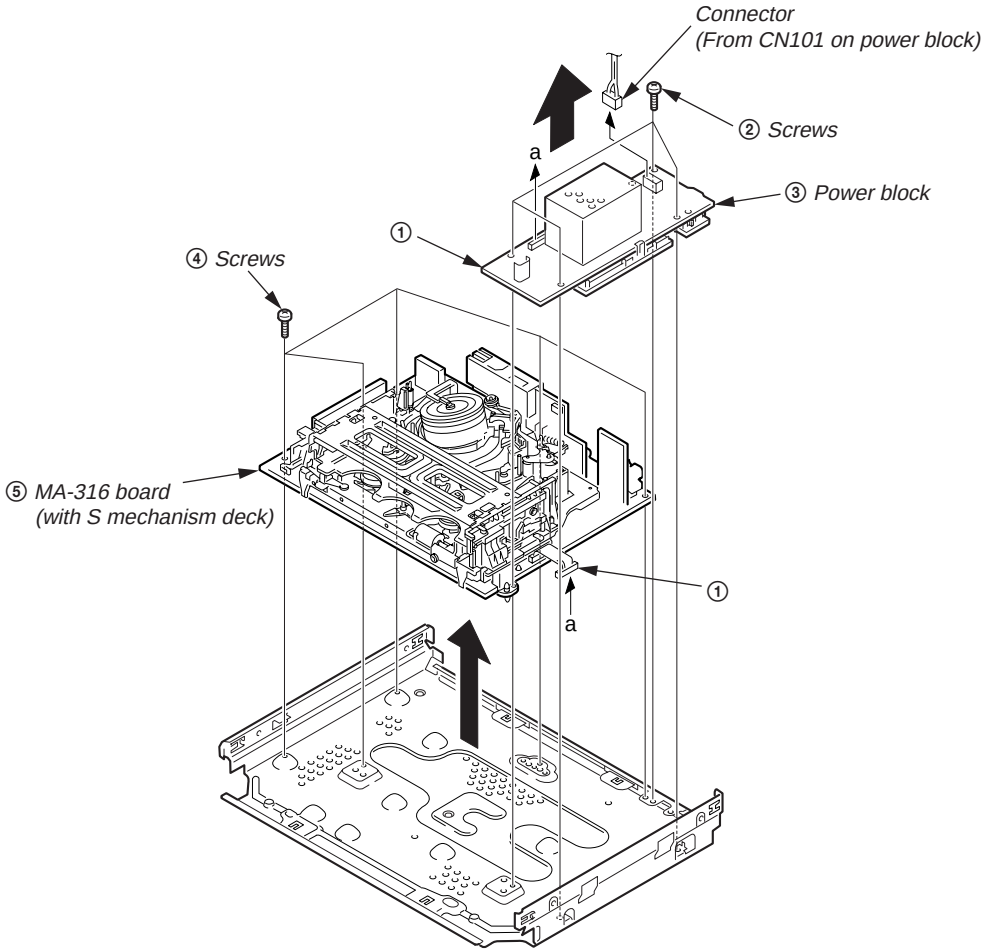
2-2. FR-128 BOARD, DM-73 BOARD



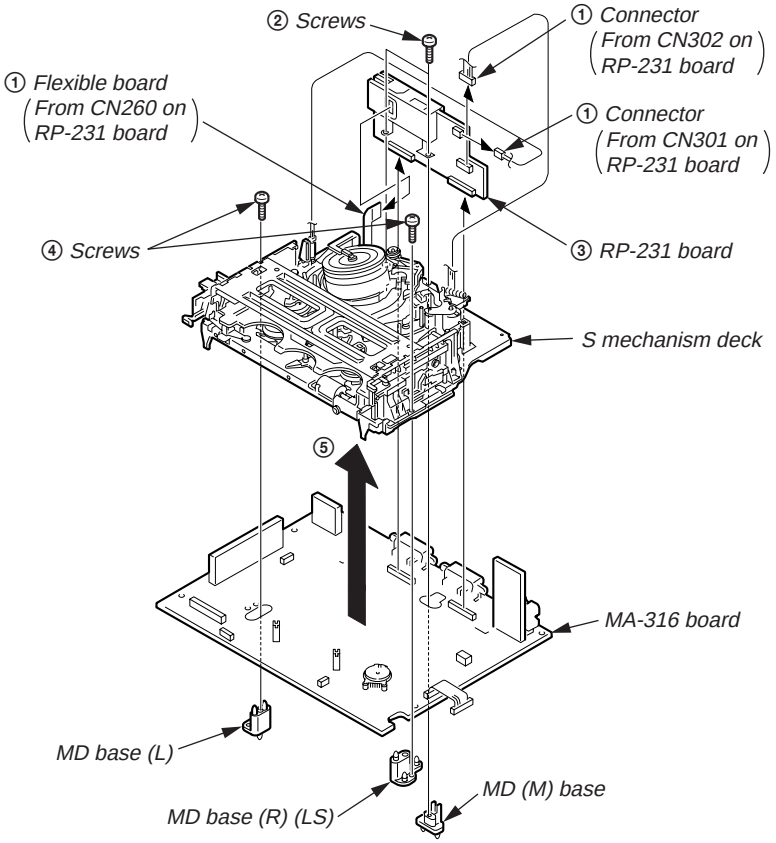
2-3. REAR PANEL



2-4. POWER BLOCK, MA-316 BOARD (WITH S MECHANISM DECK)

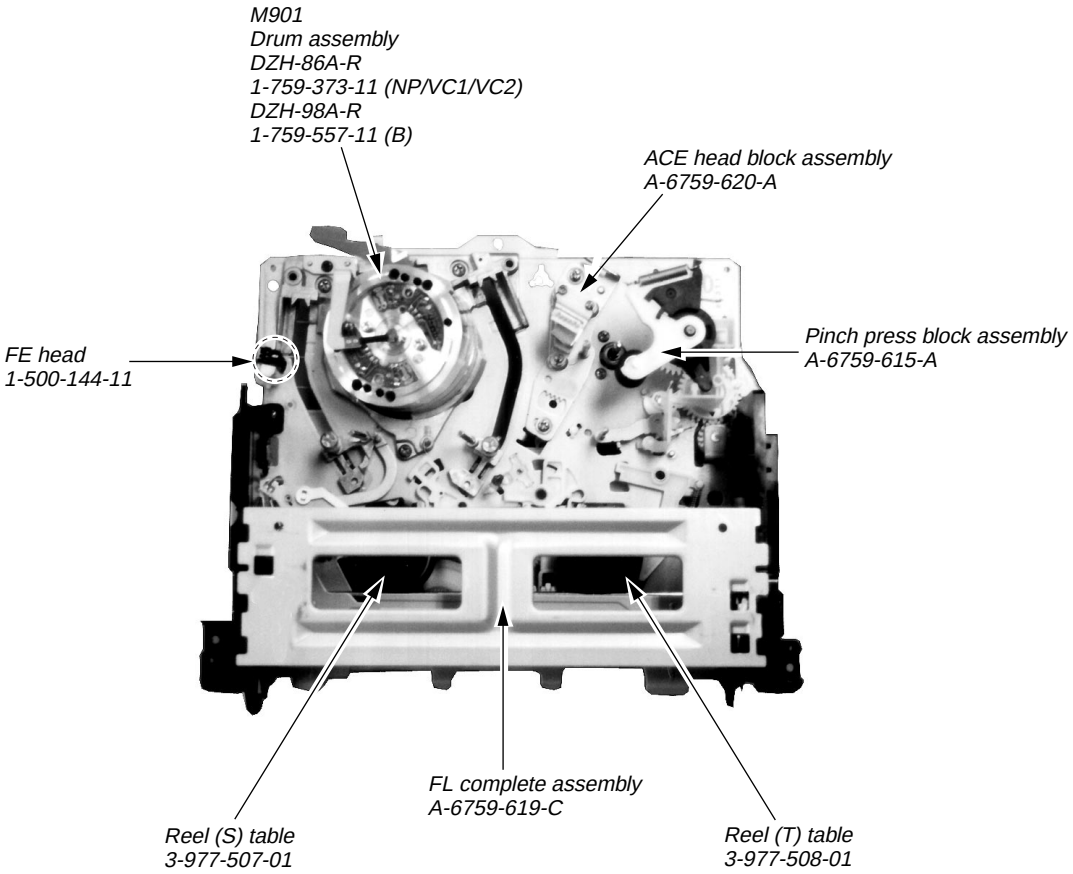


2-5. RP-231 BOARD, S MECHANISM DECK

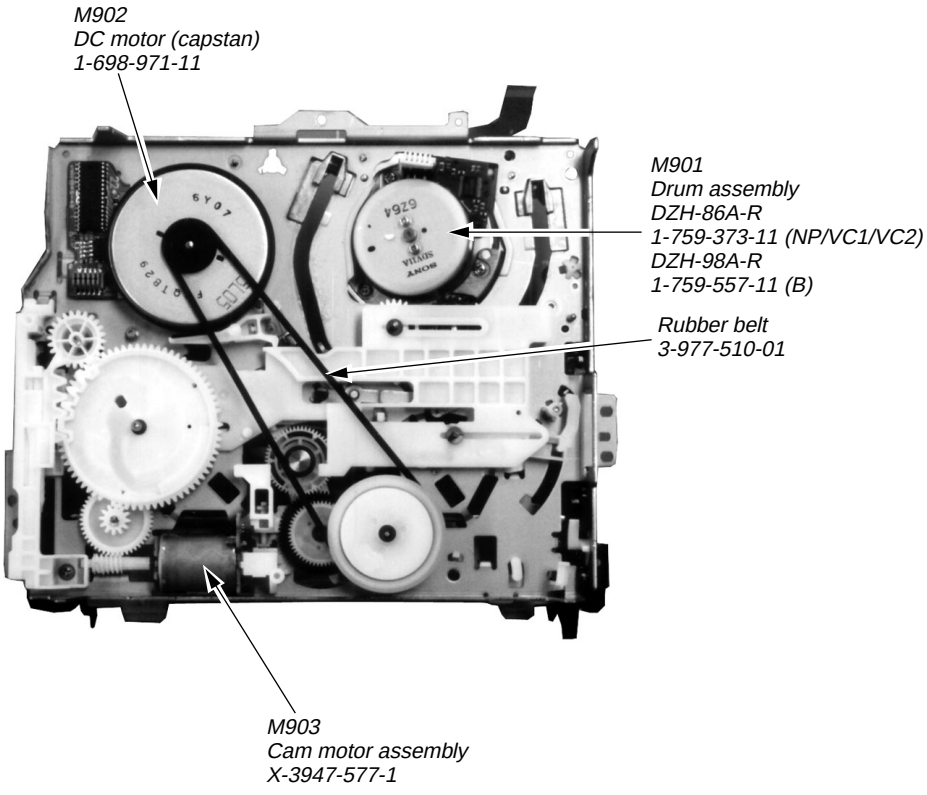


2-6. INTERNAL VIEWS

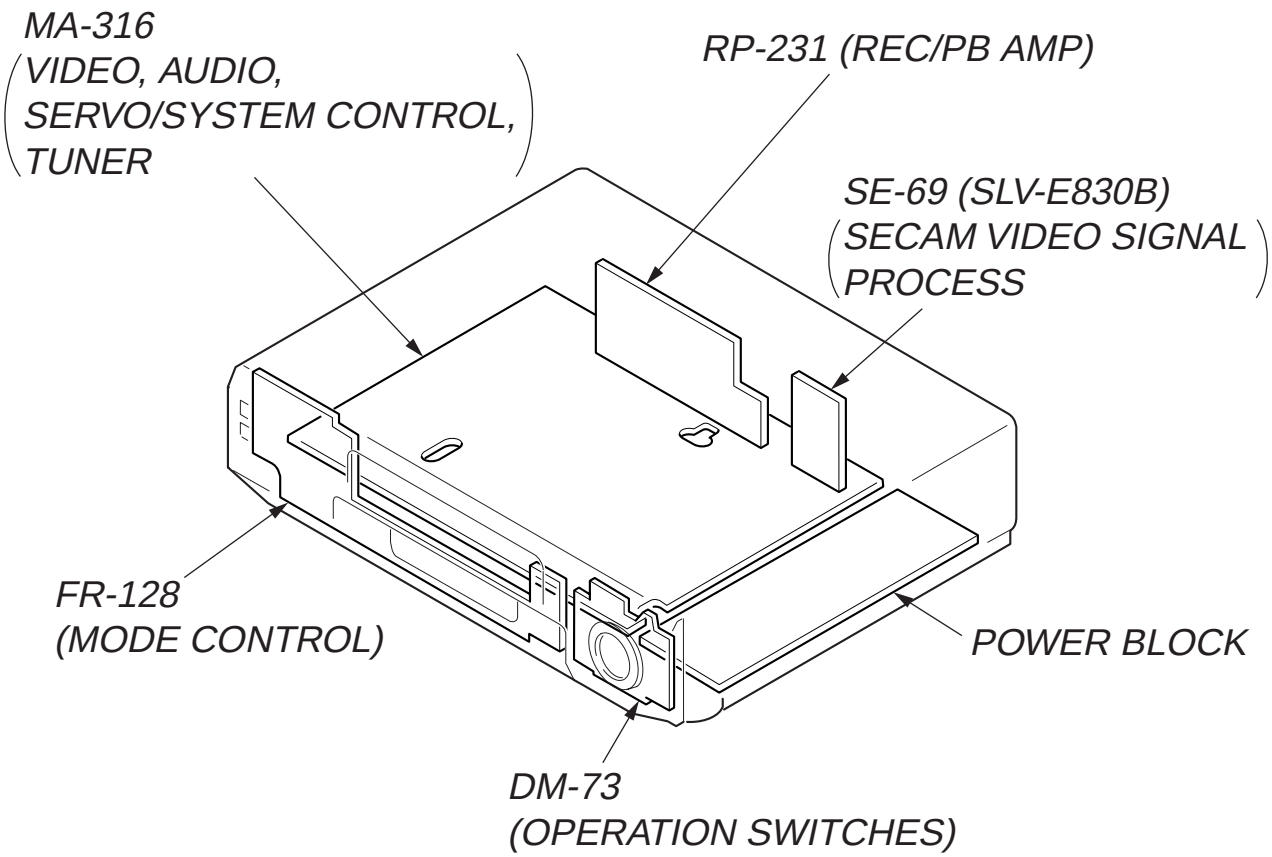
—Top View—



—Bottom View—

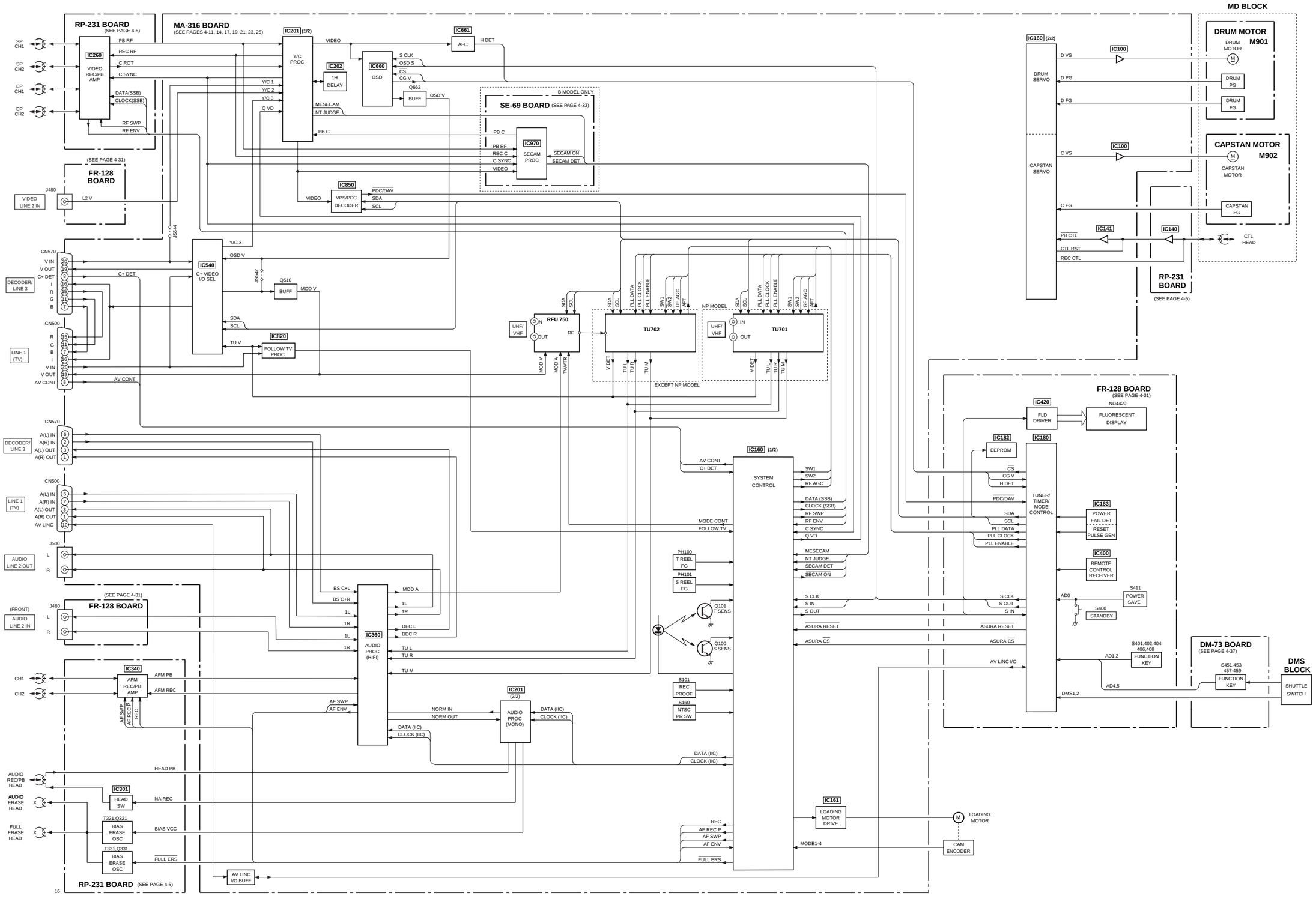


2-7. CIRCUIT BOARDS LOCATION

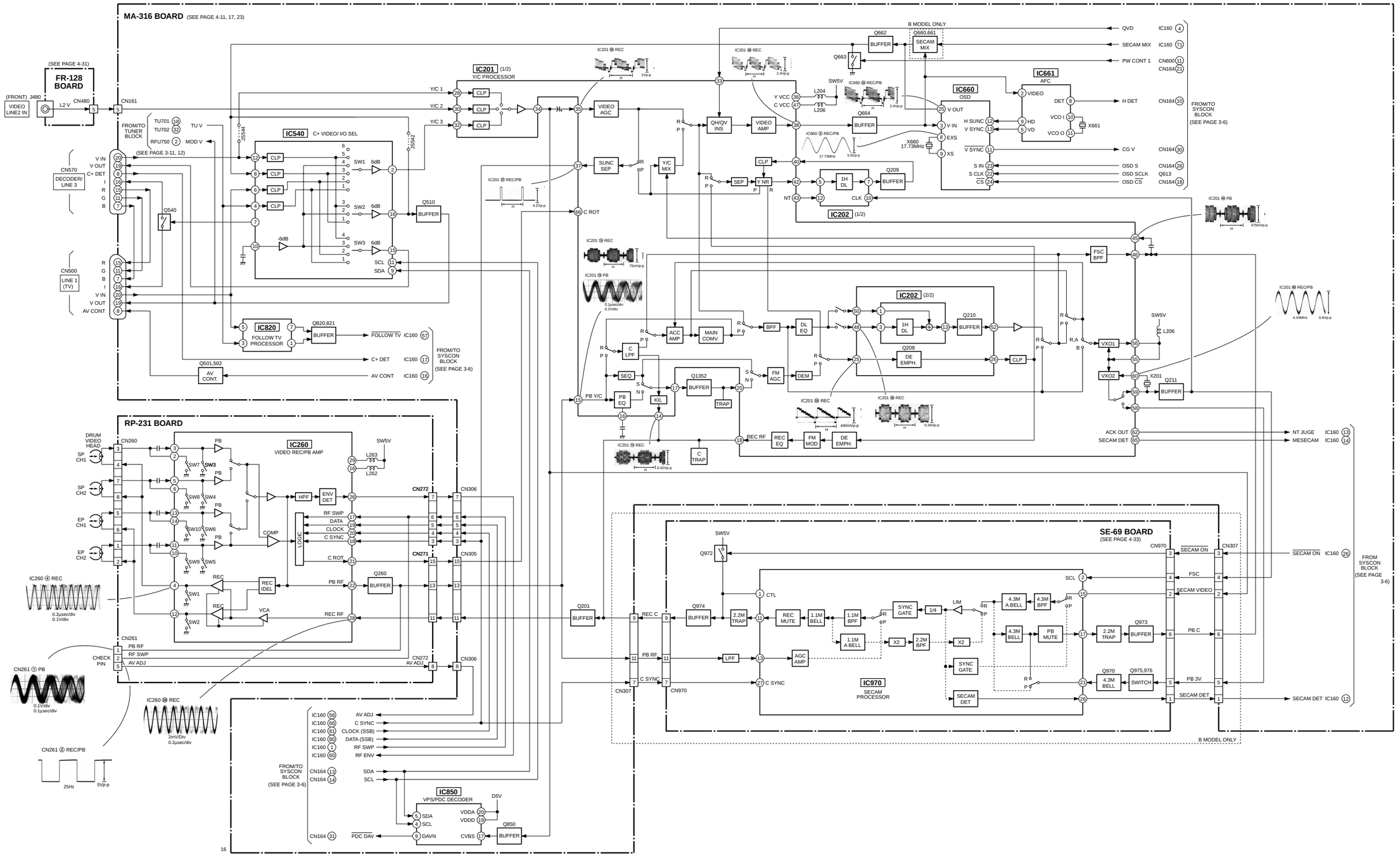


SECTION 3
BLOCK DIAGRAMS

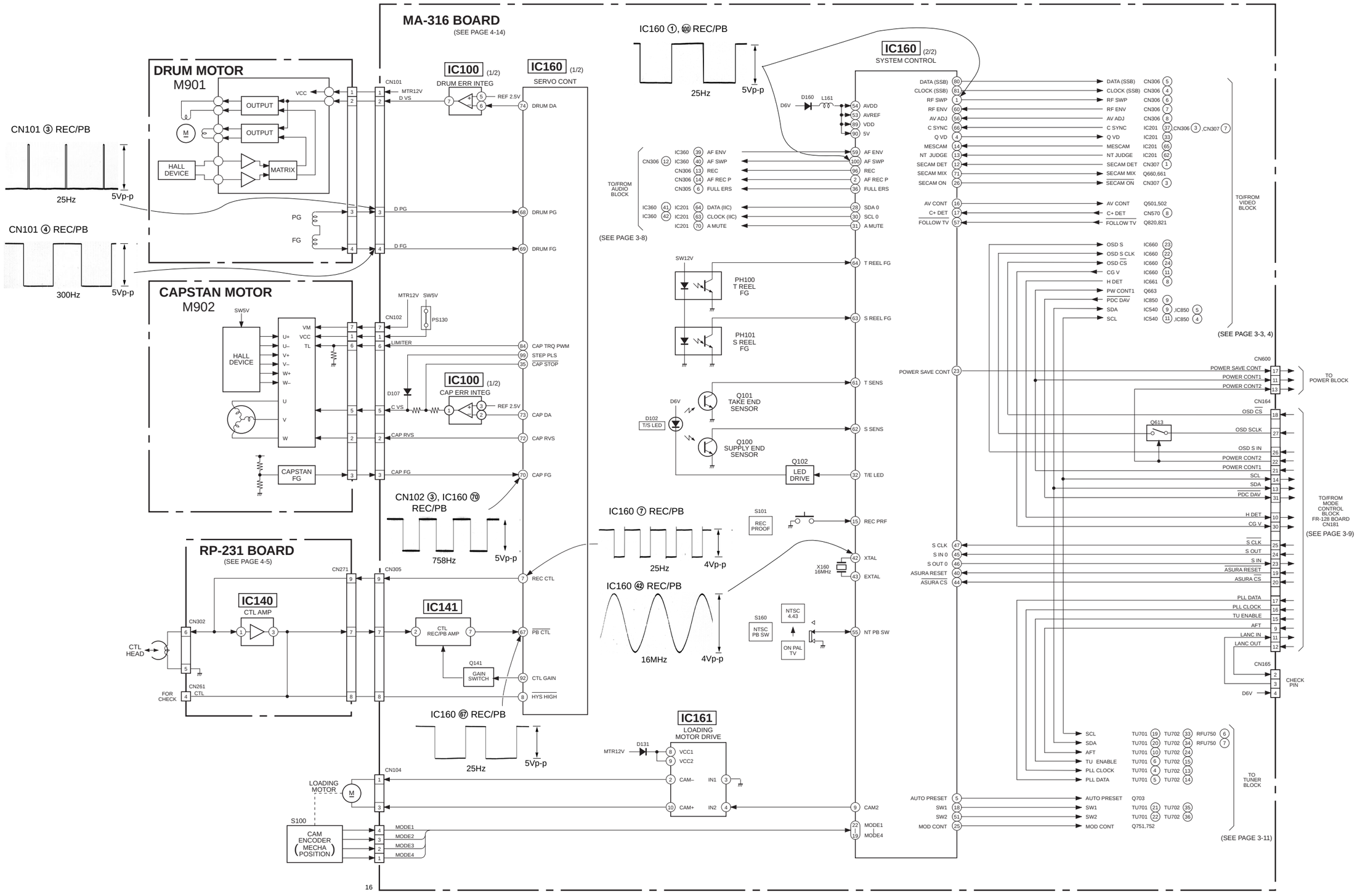
3-1. OVERALL BLOCK DIAGRAM



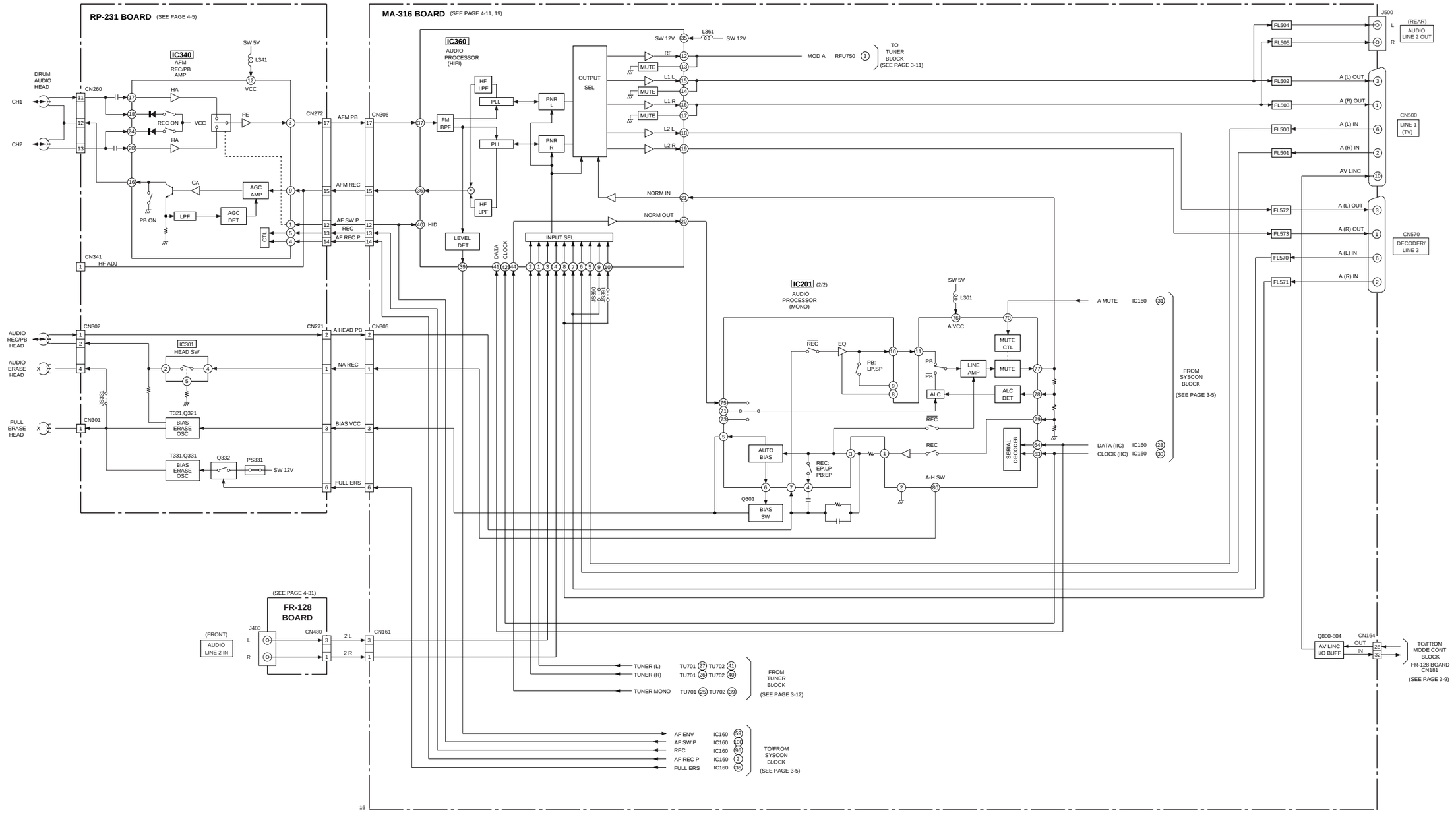
3-2. VIDEO BLOCK DIAGRAM



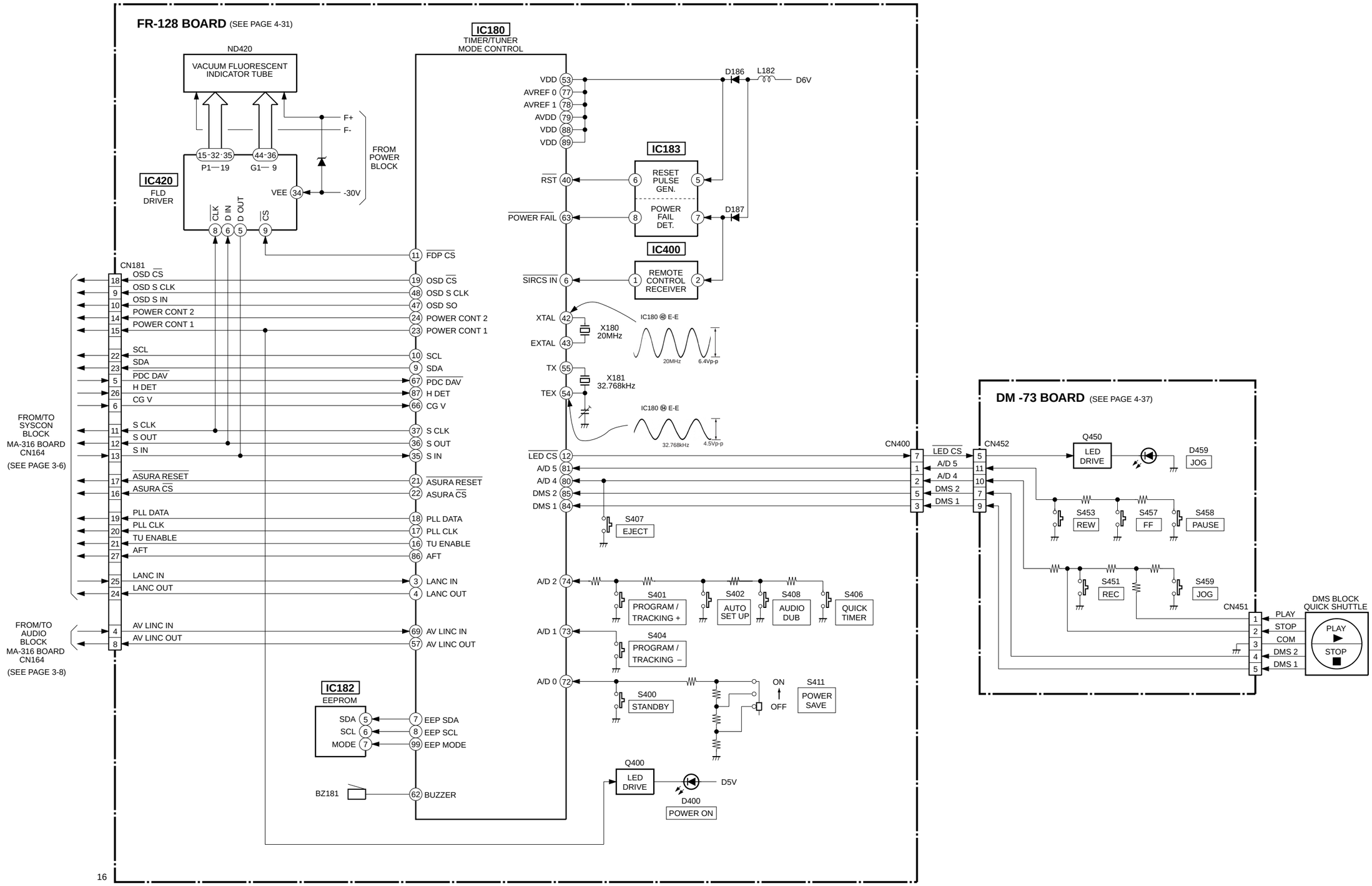
3-3. SERVO/SYSTEM CONTROL BLOCK DIAGRAM



3-4. AUDIO BLOCK DIAGRAM

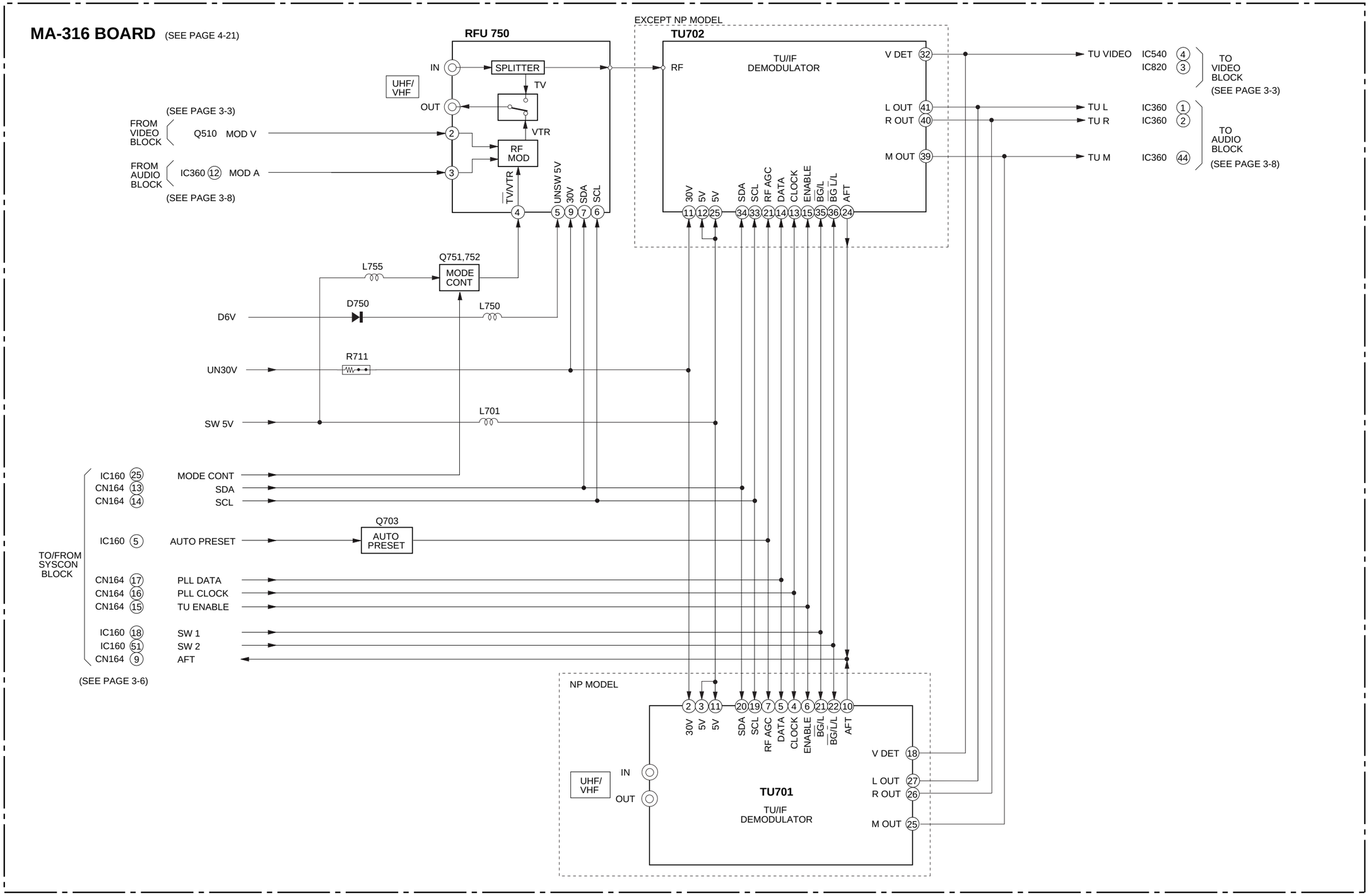


3-5. MODE CONTROL BLOCK DIAGRAM

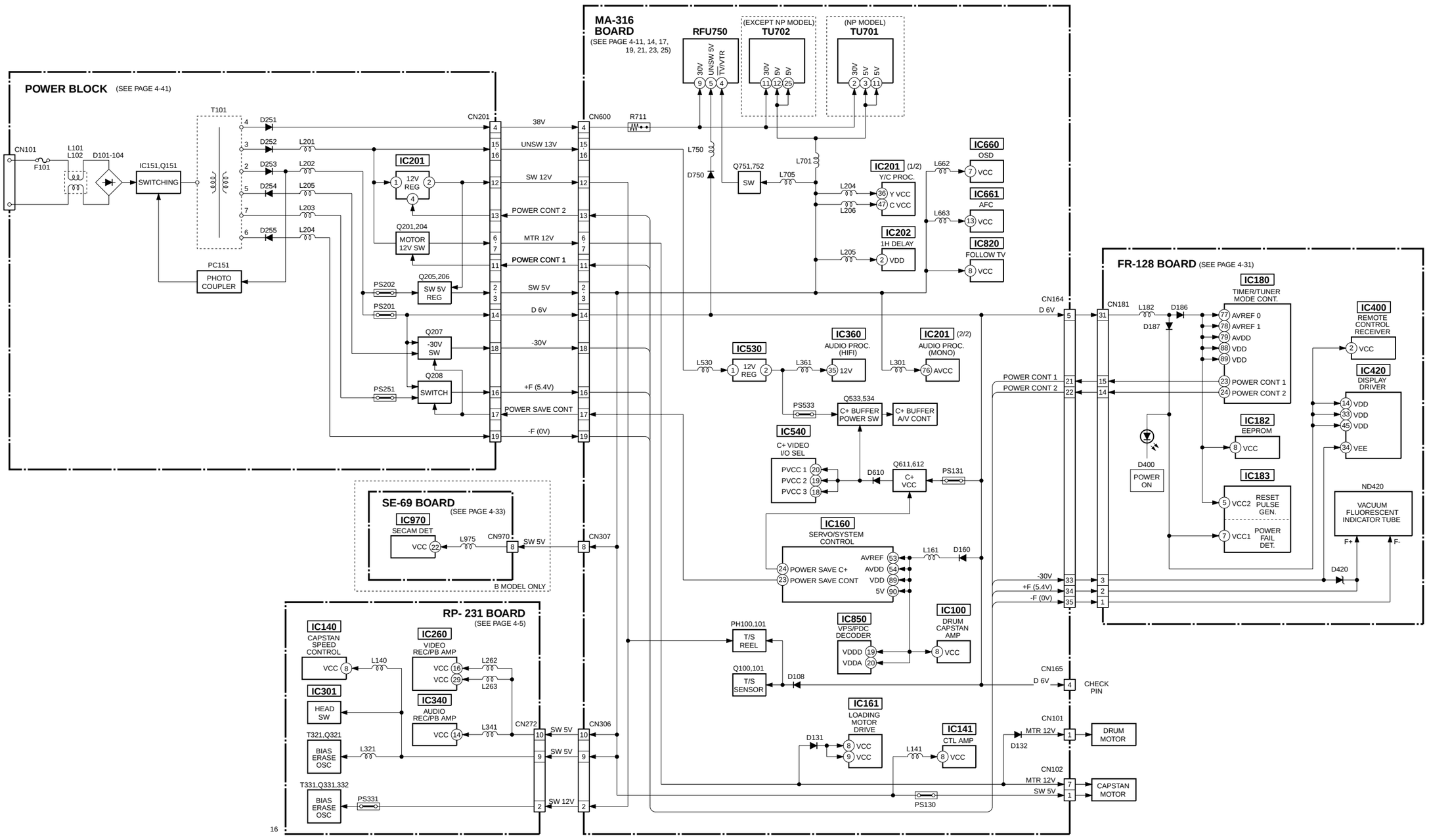


16

3-6. TUNER BLOCK DIAGRAM

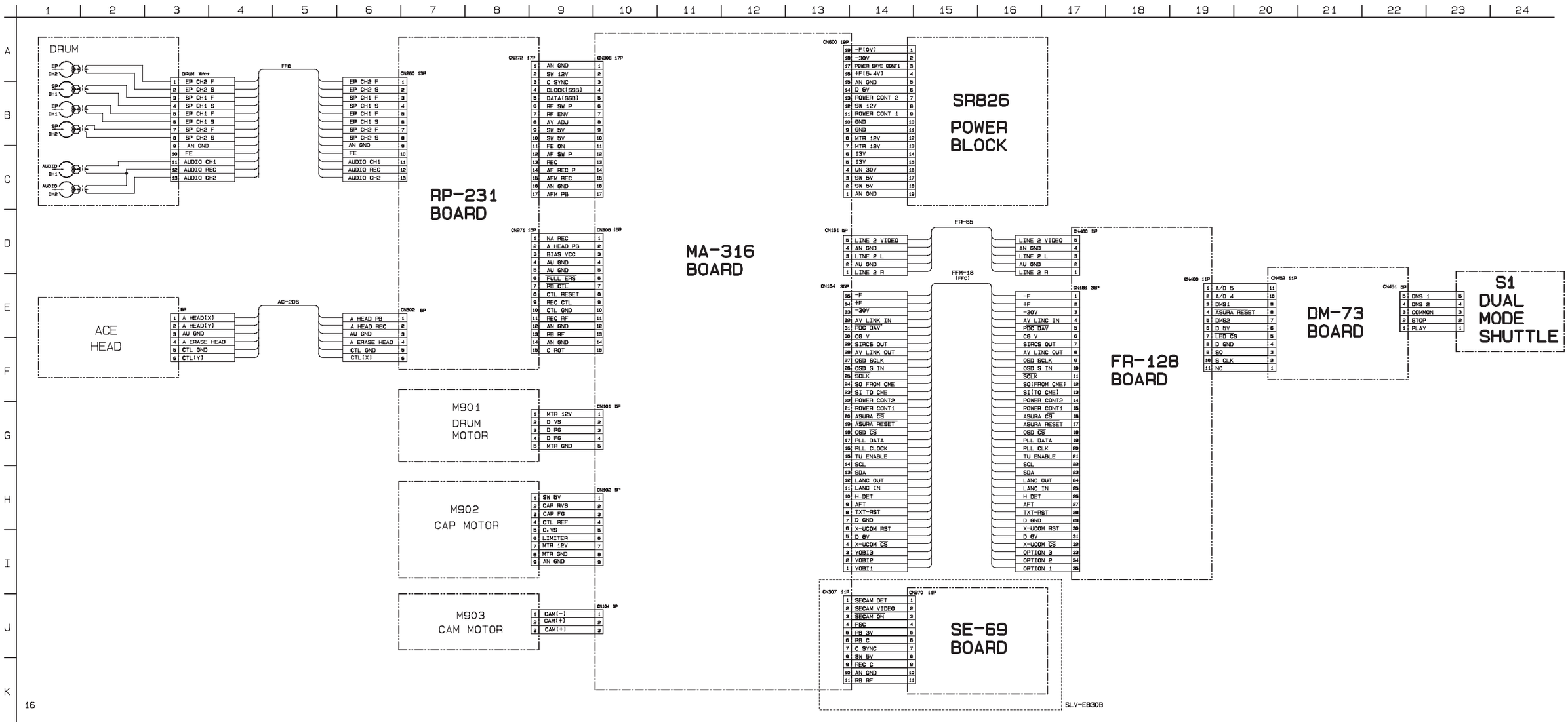


3-7. POWER SUPPLY BLOCK DIAGRAM



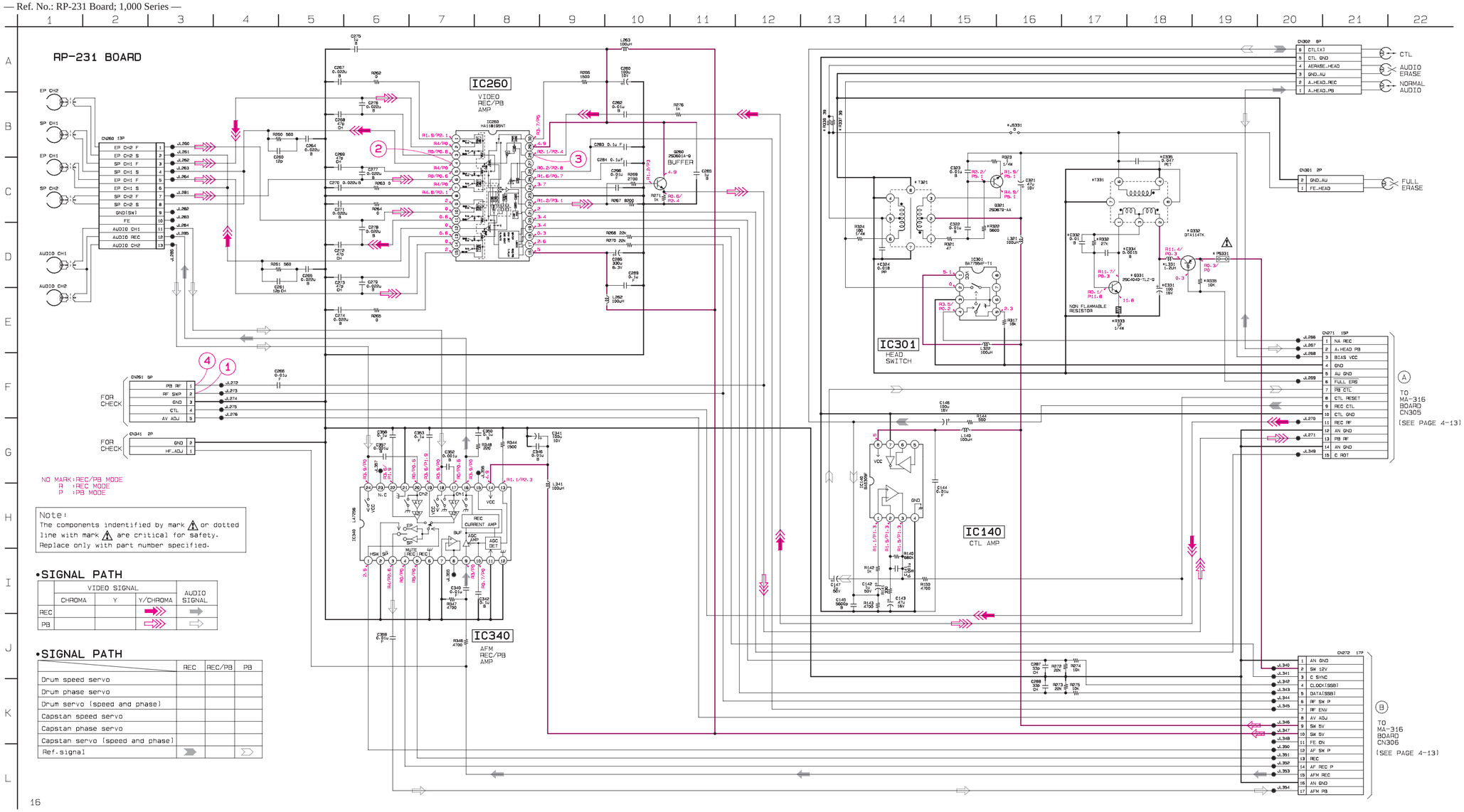
SECTION 4
PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

4-1. FRAME SCHEMATIC DIAGRAM



RP-231 (REC/PB AMP) SCHEMATIC DIAGRAM

— Ref. No.: RP-231 Board; 1,000 Series —



•SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			→	→
PB			→	→

•SIGNAL PATH

	REC	REC/PB	PB
Drum speed servo			
Drum phase servo			
Drum servo (speed and phase)			
Capstan speed servo			
Capstan phase servo			
Capstan servo (speed and phase)			
Ref.signal	→		⇨

THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS. (In addition to this, the necessary note is printed in each block.)

- **For printed wiring boards.**
- ▬ : Pattern from the side which enables seeing.

Caution :

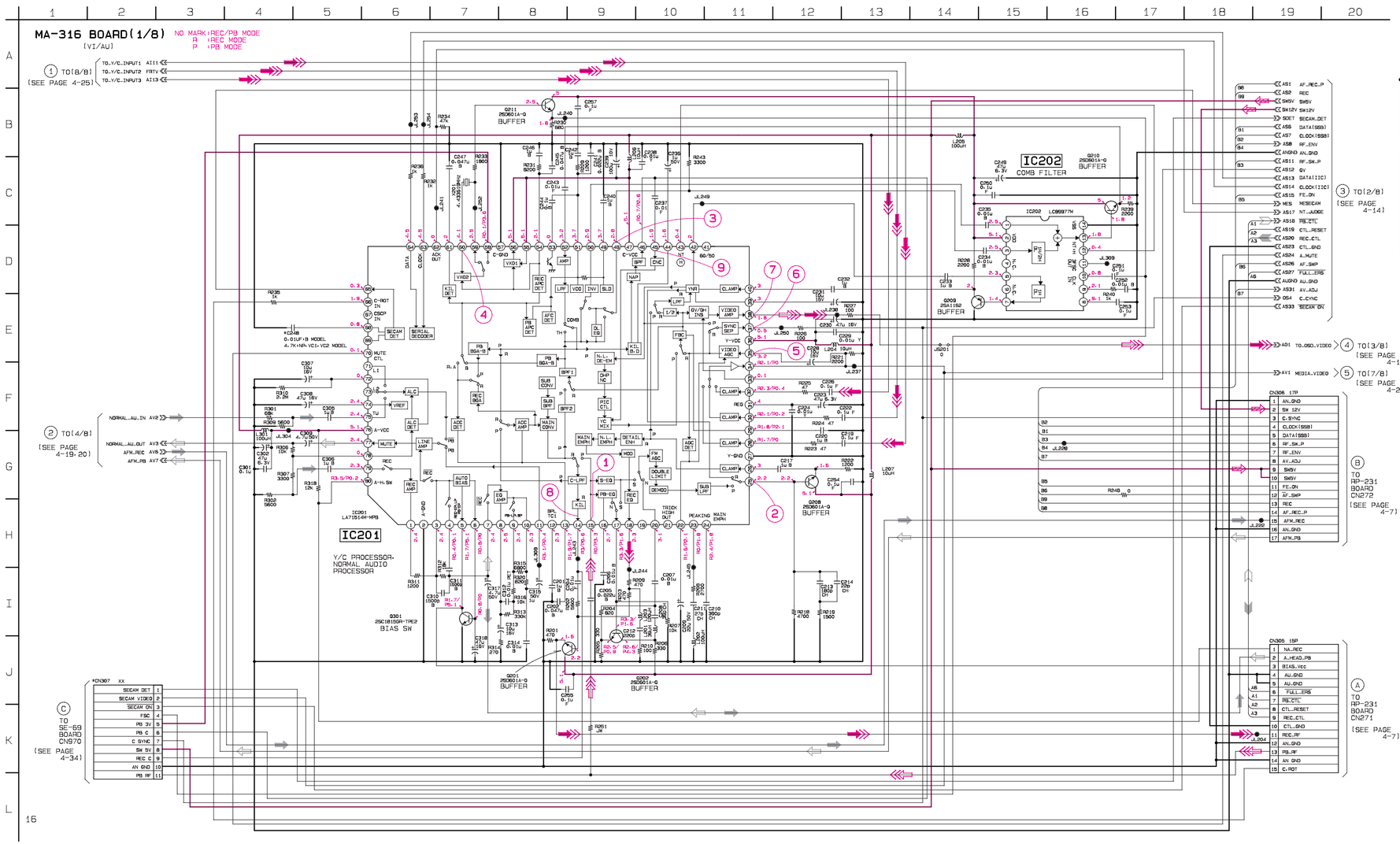
Pattern face side: (Conductor Side)	Parts on the pattern face side seen from the pattern face are indicated.
Pattern face side: (Component Side)	parts on the parts face side seen from the parts face are indicated.

- **For schematic diagrams.**
- Caution when replacing chip parts. New parts must be attached after removal of chip. Be careful not to heat the minus side of tantalum capacitor, because it is damaged by the heat.
- All resistor are in ohms, 1/4W unless otherwise noted. Chip resistor are 1/10W unless otherwise noted. kΩ: 1000Ω, MΩ, : 1000kΩ.
- All capacitors are in μF unless otherwise noted. pF : μμF. 50V or less are not indicated except for electrolytics and tantalums.
- ▭ : panel designation.
- △ : internal component.
- ▬ : B+ Line. *
- ▬ ▬ : B– Line. *
- ▨ : IN/OUT direction of (+,–) B LINE. *
- Circled numbers refer to waveforms. *
- Readings are taken with a PAL color-bar signal input.
- Voltage are dc between ground and measurement points.*
- Readings are taken with a digital multimeter (DC10MΩ).*
- Voltage variations may be noted due to normal production tolerances.*

When indicating parts by reference number, please include the board name.

- * : indicated by the color red.

MA-316 (VIDEO, NORMAL AUDIO) SCHEMATIC DIAGRAM
— Ref. No.: MA-316 Board; 2,000 Series —



•SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			➡	⇨
PB			⇨	⇨

	REC	REC/PB	PB
Drum speed servo			
Drum phase servo			
Drum servo (speed and phase)			
Capstan speed servo			
Capstan phase servo			
Capstan servo (speed and phase)			
Ref.signal	➡		⇨

MA-316 BOARD (1/3)

① IC201 ⑲ REC — H — 75mVp-p
⑤ IC201 ㉝ REC — H — 1Vp-p
① IC201 ⑮ PB — 0.1μsec/div 0.2V/div
⑥ IC201 ㊲ REC/PB — H — 4.2Vp-p
② IC201 ㉕ REC — H — 440mVp-p
⑦ IC201 ㊳ REC — H — 2.4Vp-p
③ IC201 ㊽ REC — H — 0.34Vp-p
⑧ IC201 ⑭ REC — H — 0.42Vp-p
④ IC201 ㊵ REC/PB — 4.43MHz — 0.6Vp-p
⑨ IC201 ㊺ PB — H — 470mVp-p

MA-316 (SERVO/SYSTEM CONTROL) SCHEMATIC DIAGRAM

— Ref. No.: MA-316 Board; 2,000 Series —

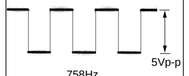
• See page 4-9 for MA-316 BOARD printed wiring board.

MA-316 BOARD (2/3)

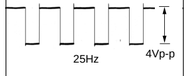
⑫ CN101 ③ REC/PB

⑬ CN101 ④ REC/PB

⑭ CN102 ③, IC160 ⑩ REC/PB



⑮ IC160 ⑦ REC/PB



⑯ IC160 ㊷ REC/PB

⑰ IC160 ①, ㉘ REC/PB

⑱ IC160 ㊼ REC/PB

MA-316 BOARD (2/8)
(SYS)

IC141
CTL AMP

IC160
SERVO/SYSTEM CONTROL

IC100
DRUM ERROR/ CAPSTAN ERROR INTEGRATOR

IC161
LOADING MOTOR DRIVE

LED DRIVE

Q611-612
C+ VCC SW

M901
DRUM MOTOR

M902
CAPSTAN MOTOR

M903
CAM MOTOR

ROTARY ENCODER

SWITCH

CASSETTE IN /REC PROOF

TO POWER BLOCK (SEE PAGE 4-42)

TO FR-128 BOARD CN180 (SEE PAGE 4-31)

FOR CHECK

NO MARK : REC/PB MODE
R : REC MODE
P : PB MODE

•SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC				
PB				

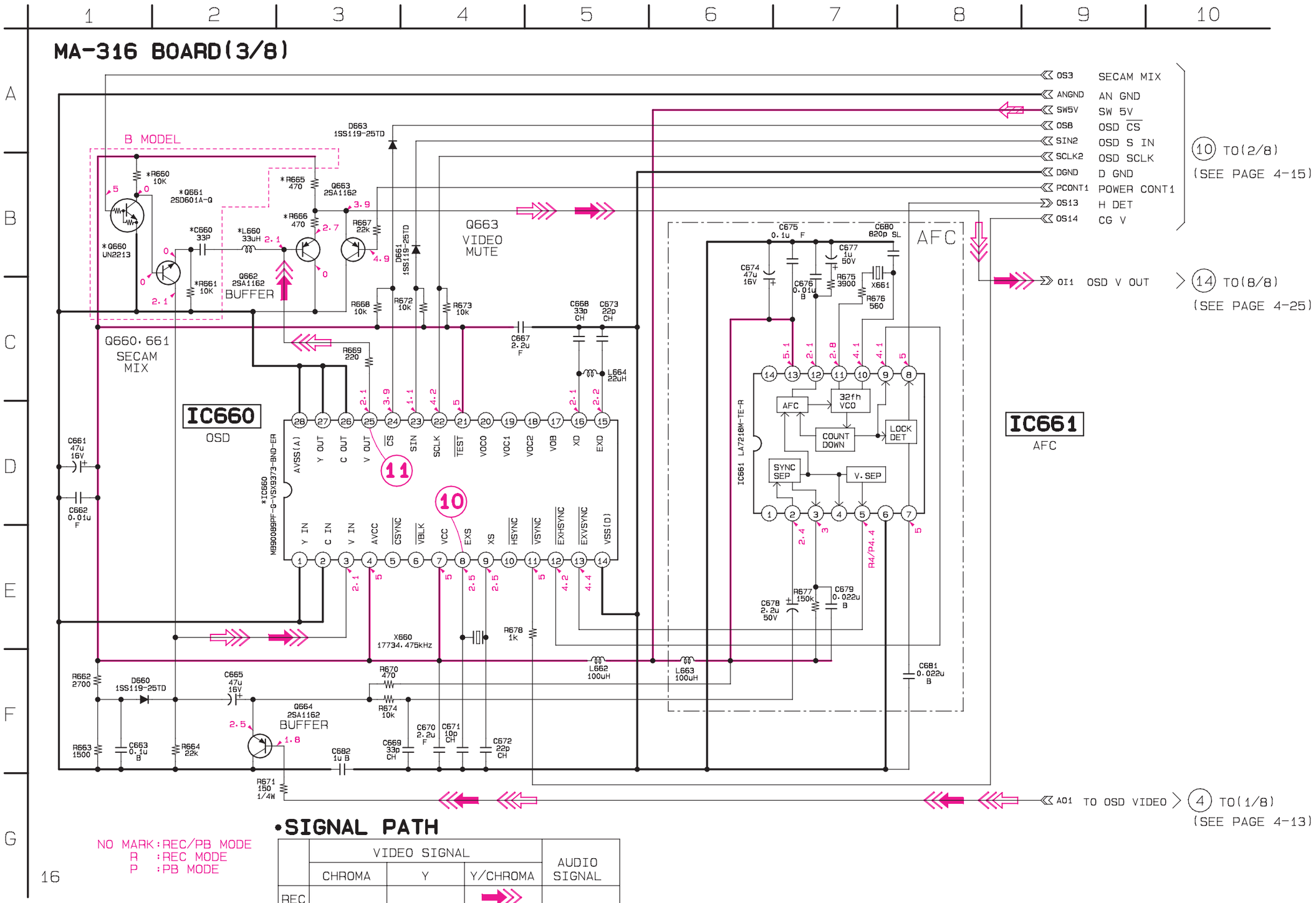
	REC	REC/PB	PB
Drum speed servo			
Drum phase servo			
Drum servo (speed and phase)			
Capstan speed servo			
Capstan phase servo			
Capstan servo (speed and phase)			
Ref.signal			

Note:
The components indentified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

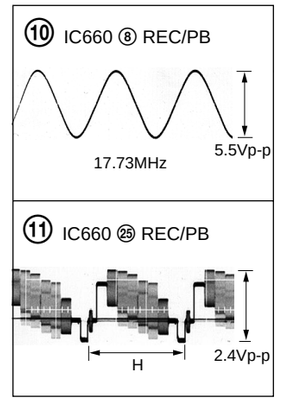
MA-316 (ON SCREEN DISPLAY) SCHEMATIC DIAGRAM

— Ref. No.: MA-316 Board; 2,000 Series —

• See page 4-9 for MA-316 BOARD printed wiring board.



MA-316 BOARD (3/3)



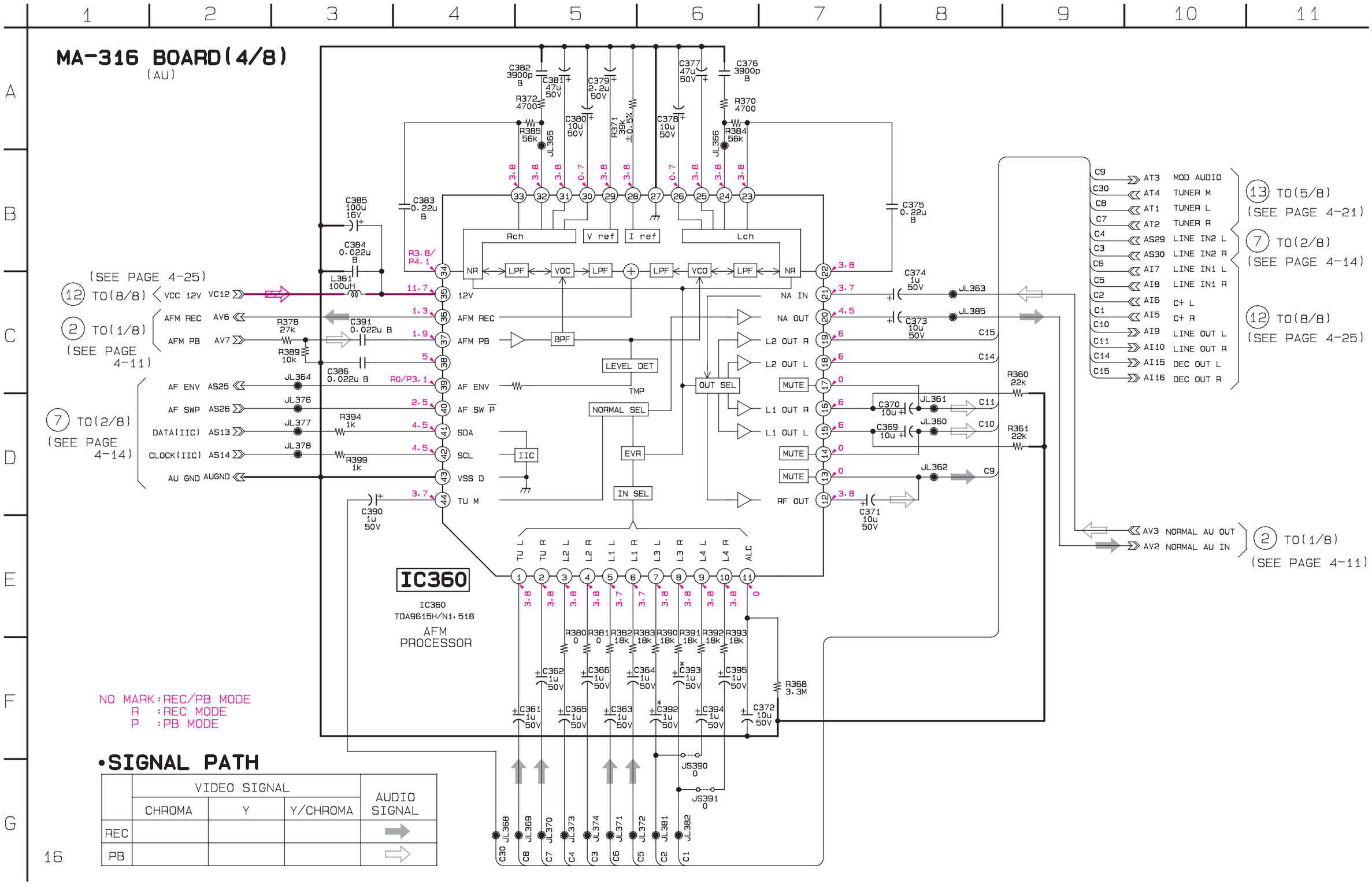
NO MARK : REC/PB MODE
R : REC MODE
P : PB MODE

•SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			➡	
PB			⇨	

MA-316 (AFM AUDIO) SCHEMATIC DIAGRAM
— Ref. No.: MA-316 Board; 2,000 Series —

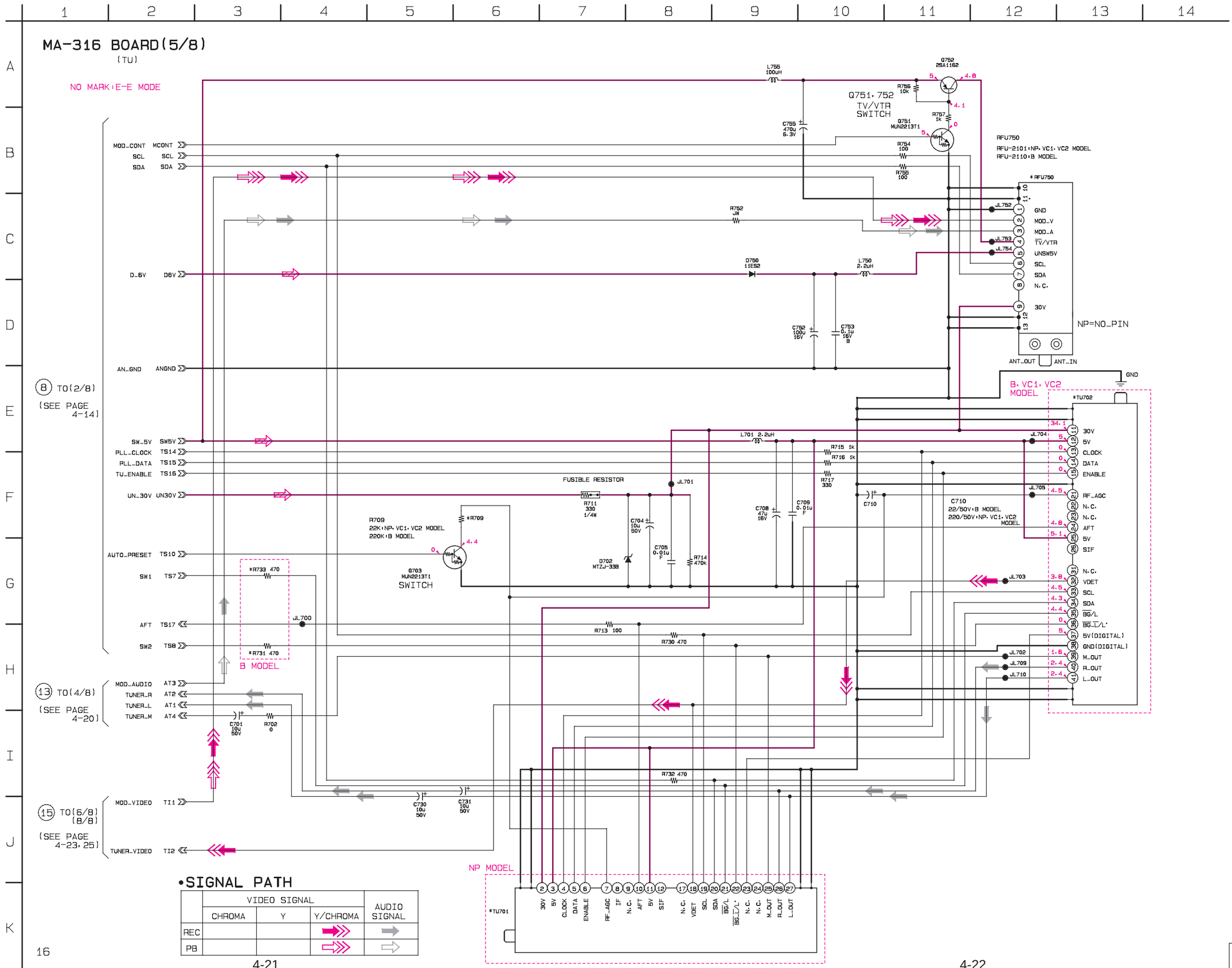
• See page 4-9 for MA-316 BOARD printed wiring board.



MA-316 (TUNER) SCHEMATIC DIAGRAM

— Ref. No.: MA-316 Board; 2,000 Series —

• See page 4-9 for MA-316 BOARD printed wiring board.



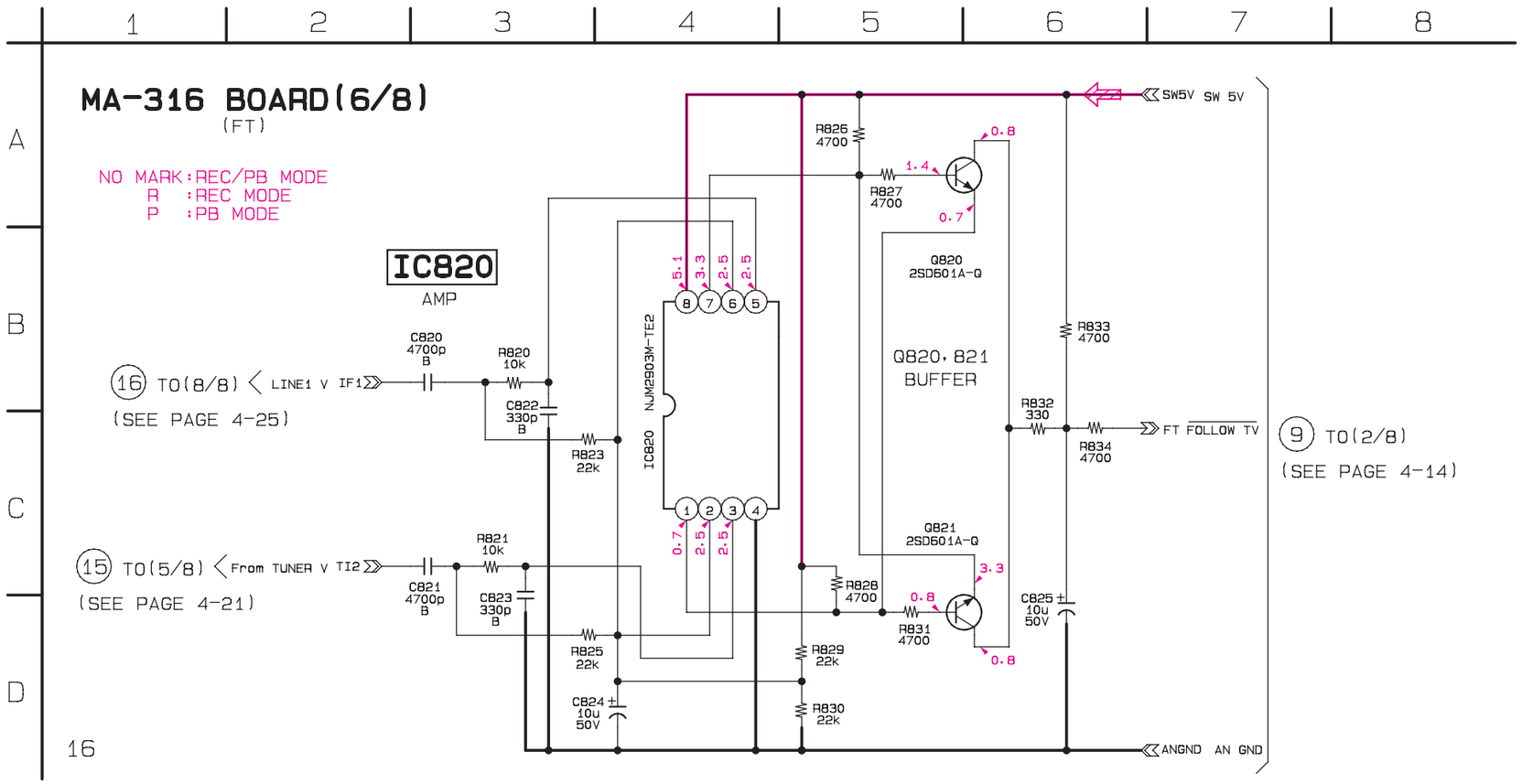
•SIGNAL PATH

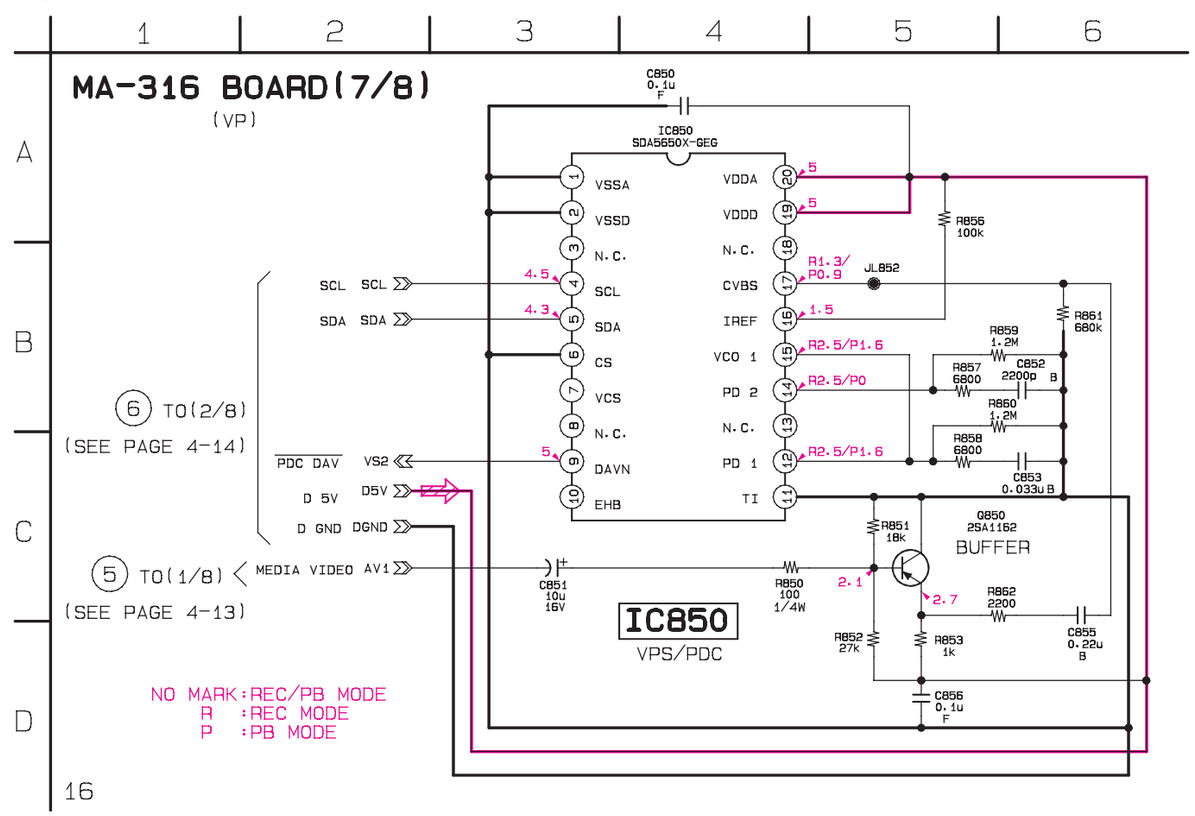
	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			⇉	→
PB			⇨	⇨

MA-316 (FOLLOW TV, PDC, VPS) SCHEMATIC DIAGRAM

— Ref. No.: MA-316 Board; 2,000 Series —

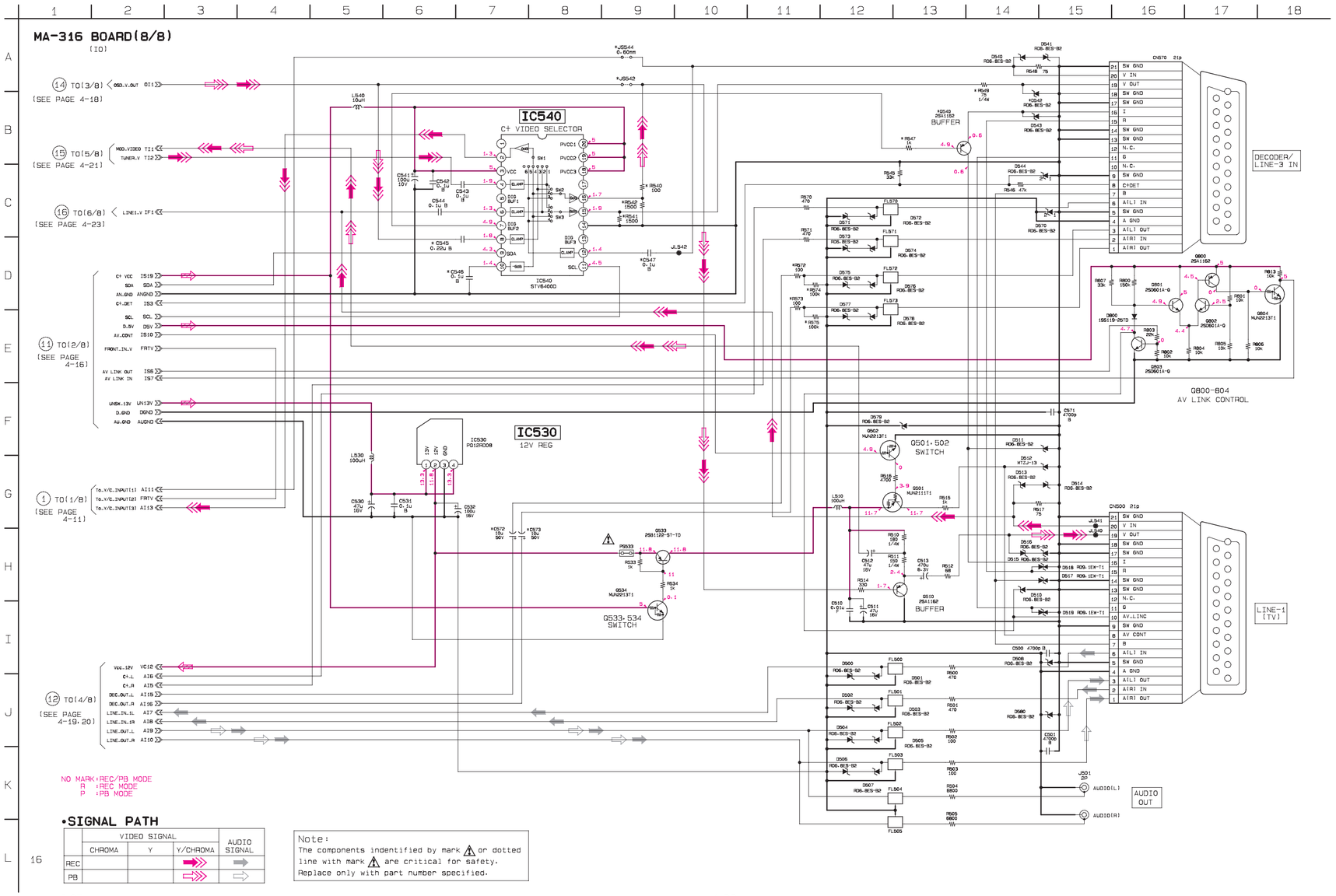
• See page 4-9 for MA-316 BOARD printed wiring board.





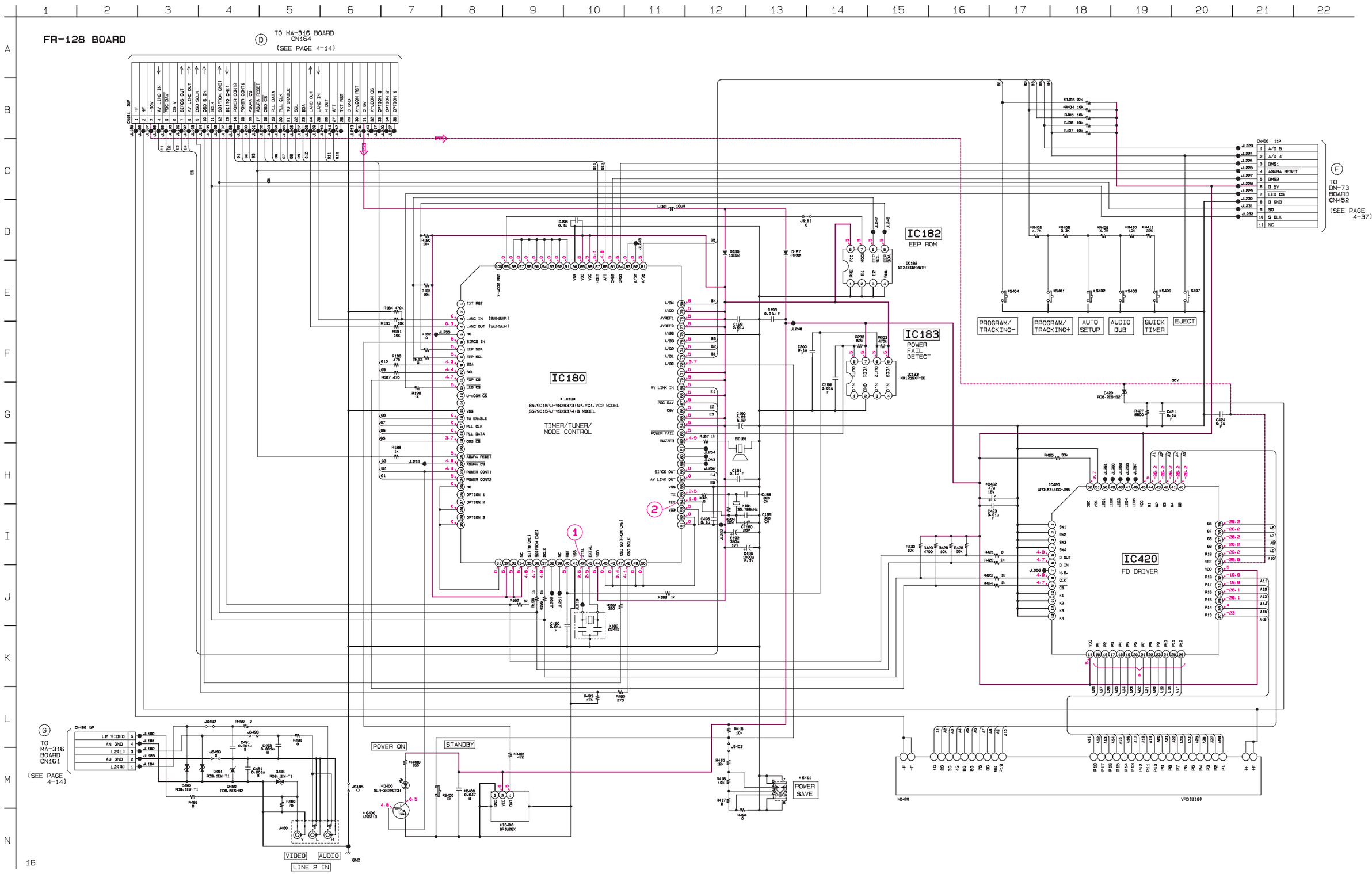
MA-316 (I/O) SCHEMATIC DIAGRAM
— Ref. No.: MA-316 Board; 2,000 Series —

• See page 4-9 for MA-316 BOARD printed wiring board.



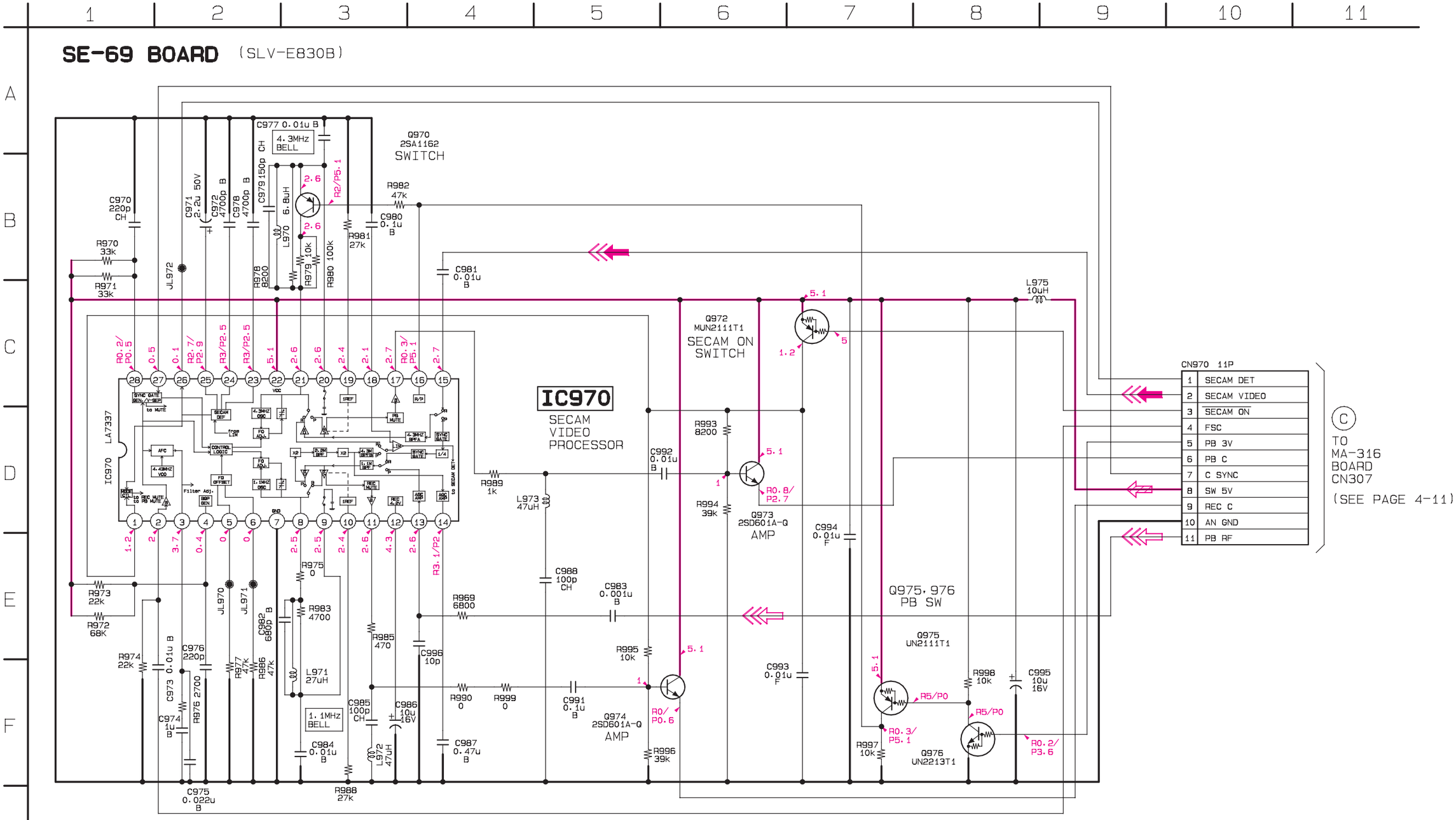
FR-128 (MODE CONTROL) SCHEMATIC DIAGRAM

— Ref. No.: FR-128 Board; 3,000 Series —



SE-69 (SECAM VIDEO SIGNAL PROCESS) SCHEMATIC DIAGRAM

— Ref. No.: SE-69 Board; 2,000 Series —



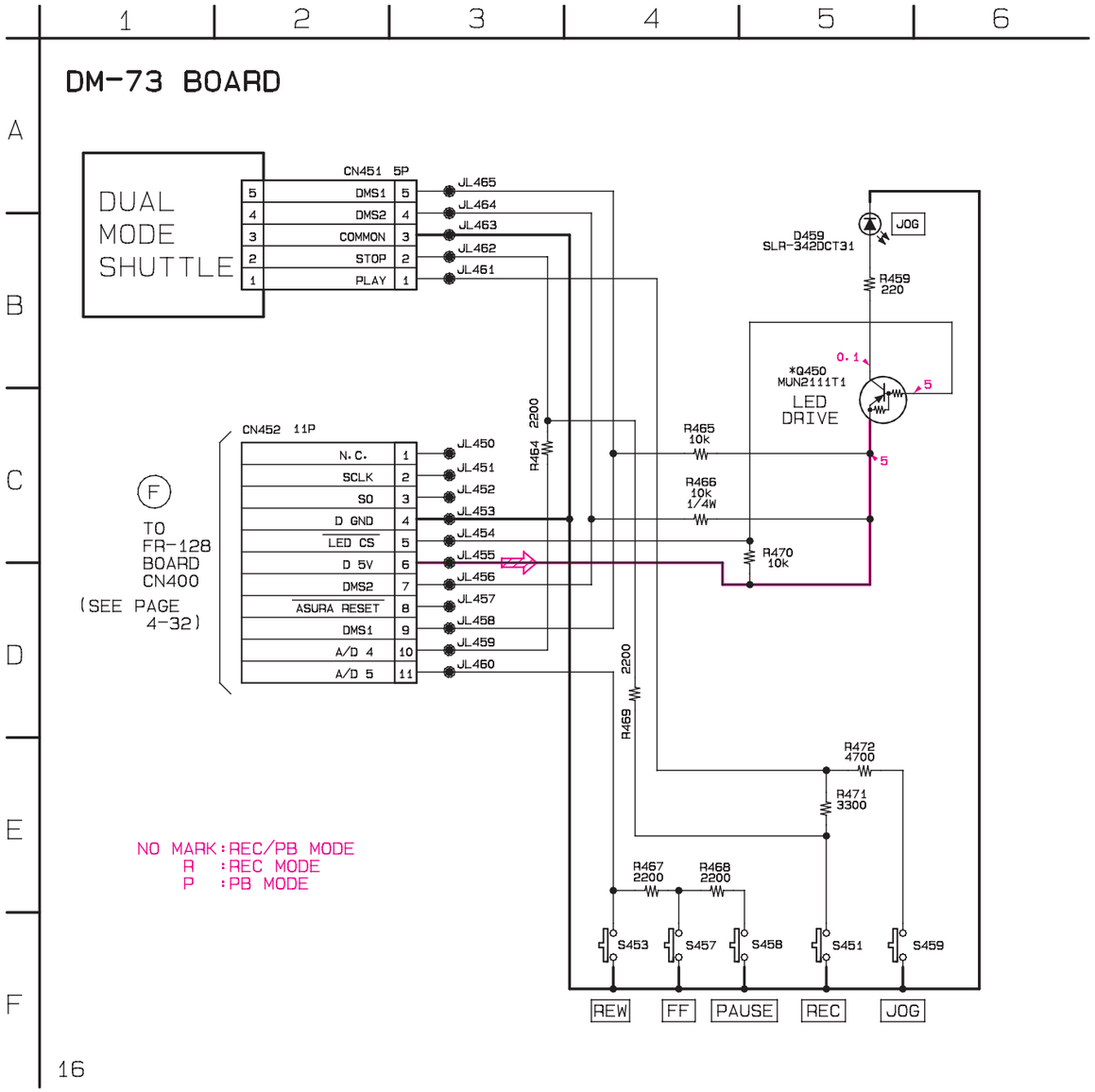
NO MARK : REC/PB MODE
R : REC MODE
P : PB MODE

•SIGNAL PATH

	VIDEO SIGNAL			AUDIO SIGNAL
	CHROMA	Y	Y/CHROMA	
REC			⇛	
PB			⇛	

DM-73 (OPERATION SWITCHES) SCHEMATIC DIAGRAM

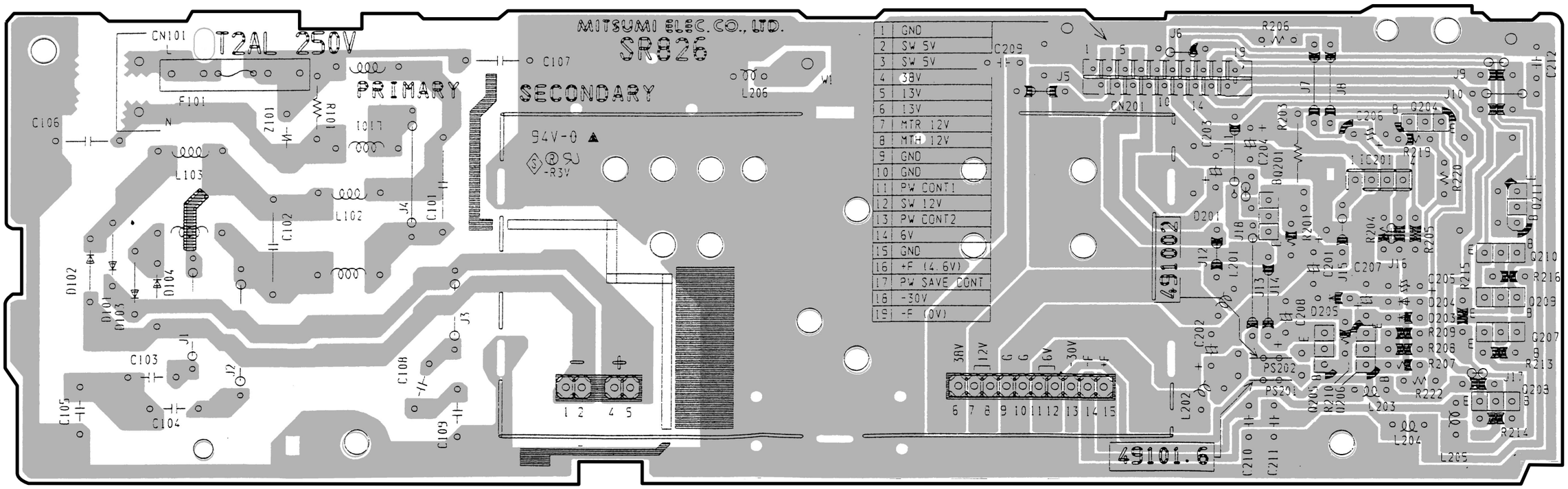
— Ref. No.: DM-73 Board; 2,000 Series —



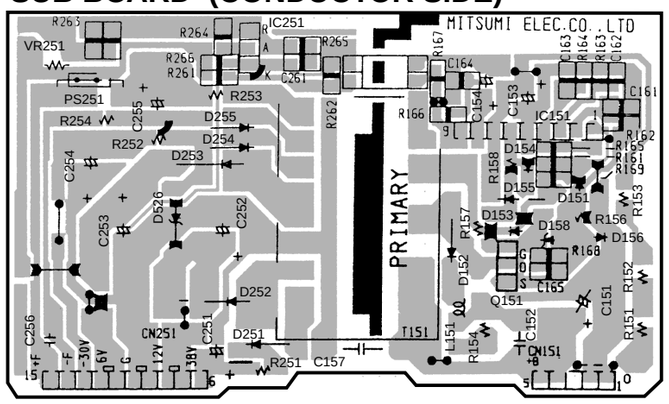
POWER BLOCK SR826 (SWITCHING REGULATOR) PRINTED WIRING BOARD
— Ref. No. SR826 Board; 9,000 Series —

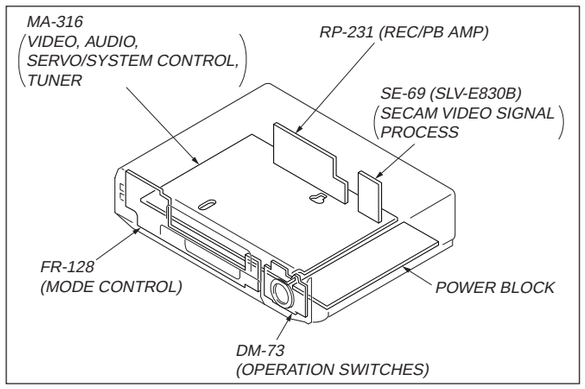
POWER BLOCK SR826

MAIN BOARD (CONDUCTOR SIDE)



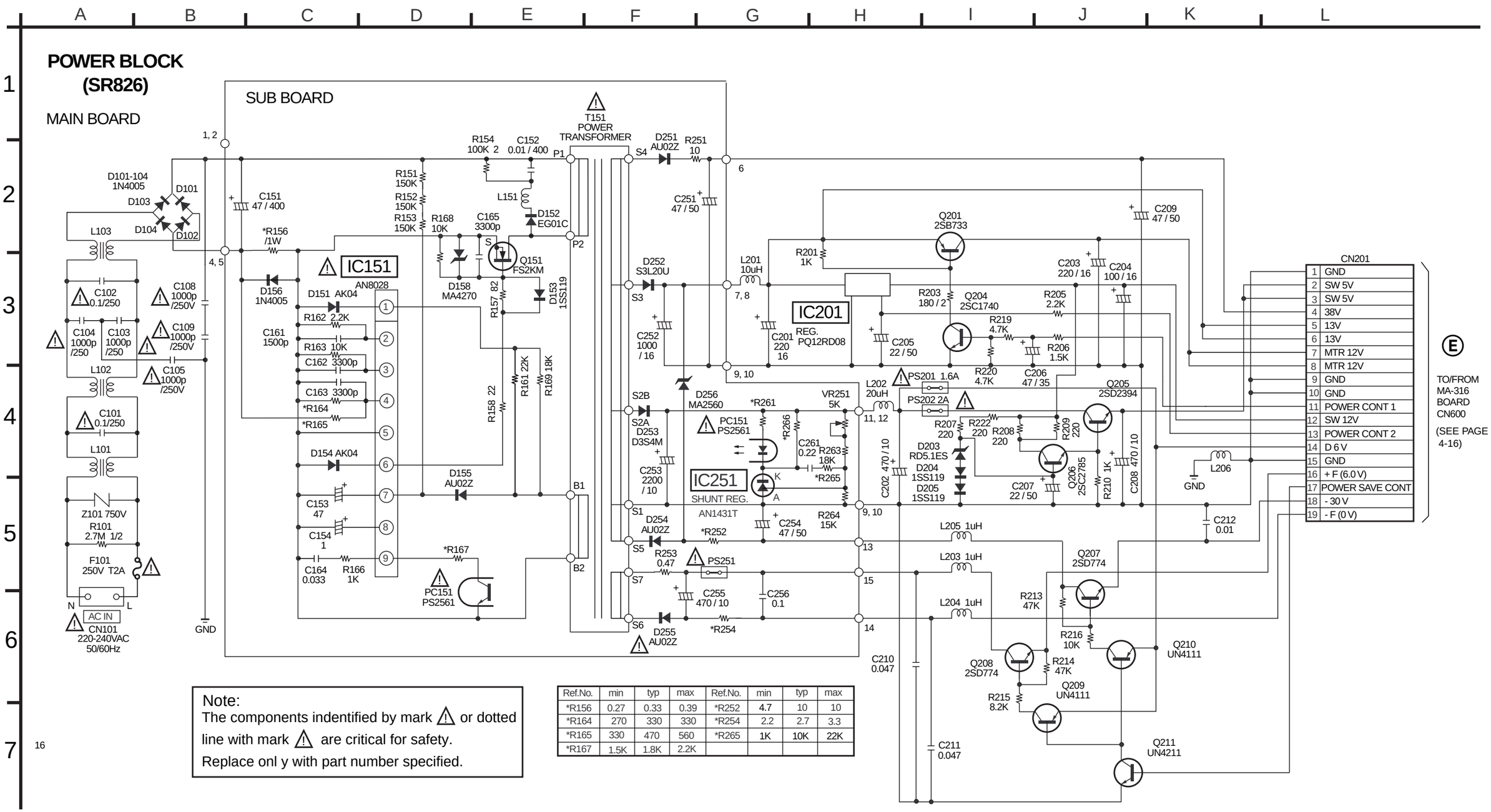
SUB BOARD (CONDUCTOR SIDE)





POWER BLOCK SR826 (SWITCHING REGULATOR) SCHEMATIC DIAGRAM

— Ref. No. SR826 Board; 9,000 Series —



Note:
The components indentified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace onl y with part number specified.

Ref.No.	min	typ	max	Ref.No.	min	typ	max
*R156	0.27	0.33	0.39	*R252	4.7	10	10
*R164	270	330	330	*R254	2.2	2.7	3.3
*R165	330	470	560	*R265	1K	10K	22K
*R167	1.5K	1.8K	2.2K				

5-1. SYSTEM CONTROL — VIDEO BLOCK INTERFACE (MA-316 BOARD IC160)

Signal	Pin No.	I/O	STOP FF/REW	TAPE THREADING	TAPE UNTHREADING	PB	PB PAUSE	SLOW	x 2	CUE	REVIEW	REC	REC PAUSE
RF SWP	①	O	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1
QVD	④	O	L	L	L	*2	*3	*3	*2	*3	*3	L	L
V SYNC	⑯	I	*4	*5	*5	*5	*5	*5	*5	*5	*5	*5	*5
NT JUDGE	⑬	O	L	L	L	L	L	L	L	L	L	L	L

*1 Synchronized with drum rotation. 25Hz 50% duty cycle.
*2 Normally “L“. “H“ when CTL signal is not generated.
*3 V period “H“ pulse.
*4 Selected by REC mode. “H“ in LP mode.“
*5 Composite sync signal (positive).

5-2. SYSTEM CONTROL — SERVO PERIPHERAL CIRCUIT INTERFACE (MA-316 BOARD IC160)

Signal	Pin No.	I/O	STOP	FF	REW	TAPE THREADING	TAPE UNTHREADING	PB	PB PAUSE	SLOW	CUE	x 2	REVIEW	REC	REC PAUSE
REC CTL	⑦	O	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	*1	Hi-Z
CAP STOP	㉟	O (O.D)	L	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	L	*3	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)	Hi-Z (O.D)
STEP PLS	㊴	O	L	L	L	L	L	L	L	*2	L	L	L	L	L
PB CTL	㊼	I	H	*6	*6			*1	H/L	*2	*6	*6	*6	*1	H
DRM PG	㊽	I	*4	*1	*1	*5	*5	*1	*1	*1	*1	*1	*1	*1	*1
DRM FG	㊾	I	*4	*7	*7	*5	*5	*7	*7	*7	*7	*7	*7	*7	*7
CAP FG	㊿	I	H/L	*6	*6	*5	*5	*6	H/L	*2	*6	*6	*6	*6	H/L
CAP DA	㊸	O	*8	*8	*8	*8	*8	*9	*8	*8	*9	*8	*9	*9	*8
DRM DA	㊹	O	*10	*10	*10	*10	*10	*10	*10	*10	*10	*10	*10	*10	*10
CTL RESET	⑧	I/O	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	*11	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z

*1. 25Hz pulse.
*2. Pulse at tape running.
*3. Reverse logic pulse of STEP PLS.
*4. “L” when drum rotation stops.
*5. Unstable period pulse.
*6. Pulse in period in proportional to tape speed.
*7. 300Hz pulse.
*8. Pulse at tape running.
*9. Approx. 2 msec period “H” or “L” pulse.
*10. Approx. 1.5 msec period “H” or “L” pulse.
*11. “L” when FWD SLOW, “H” when RVS SLOW.

5-3. SYSTEM CONTROL — MECHANISM INTERFACE (MA-316 BOARD IC160)

Signal	Pin No.	I/O	EJECTED	CASSETTE LOADING	CASSETTE UNLOADING	TAPE THREADING	TAPE UNTHREADING	STOP	FF	REW	PB	PB PAUSE	SLOW	x 2	CUE	REVIEW	REC	REC PAUSE
CAM2	⑨	HI-Z	L	H	L	H	L	*7	*7	*7	*7	*7	*7	*7	*7	*7	*7	*7
MODE 1 (*8)	㉒	I	H	L	L	*1	*1	H	H	H	H	H	H	H	H	L	H	H
MODE 2 (*8)	㉑	I	H	L	L	*1	*1	H	H	H	L	L	L	L	L	L	L	L
MODE 3 (*8)	⑳	I	L	L	L	*1	*1	H	L	L	L	L	L	L	L	H	L	L
MODE 4 (*8)	⑲	I	L	H	H	*1	*1	L	H	H	H	L	L	L	L	L	L	L
(IN REC PRF)	⑮	I	H	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2	*2
T REEL FG	㊹	I	H/L	H/L	H/L	H/L	H/L	H/L	*3	*3	*3	H/L	*3	*3	*3	*3	*3	H/L
S REEL FG	㊸	I	H/L	H/L	H/L	*3	*3	H/L	*3	*3	*3	H/L	*3	*3	*3	*3	*3	H/L
T/E LED	㉜	O (O.D)	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4	*4
$\overline{\text{CAP STOP}}$	㉟	O (O.D)	L	L	L	H	H	L	H	H	H	L	*5	H	H	H	H	L
CAP RVS	㉜	O	H			L	H	H/L	L	H	L	L	L/*5	L	L	H	L	L
T SENS	㊶	I	*4	*4	*4	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6
S SENS	㊷	I	*4	*4	*4	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6	*6

*1. Uncertainly.
*2. "L" when erasing protection tab is bent. "H" when not bent.
*3. Pause of period in proportion to reel rotating speed.
*4. Approx. 2 msec period "H" pulse.
*5. Pulse at tape running.
*6. Normally "L". 2 msec period "H" pulse when tape top or tape end is detected.
*7. When transition to UNLOADING direction : "L".
When transition to LOADING direction : "H".
When CAM MOTOR is stopped : Hi-Z.
*8. When RVS slow : Mode 1="L"
When RVS slow : Mode 2="L"
When RVS slow : Mode 3="H"
When RVS slow : Mode 4="L"

5-4. SYSTEM CONTROL — SYSTEM CONTROL PERIPHERAL CIRCUIT INTERFACE (MA-316 BOARD IC160)

Signal	Pin No.	I/O	I/O Level
$\overline{\text{ASURA RESET}}$	㊵	I	Normally "H", "L" when service interruption is detected or restored.
$\overline{\text{ASURA CS}}$	㊹	I	Chip select signal from timer microprocessor. V period "L" pulse.
S IN 0	㊺	I	Serial communication data from timer microprocessor. V period " L" pulse.
S OUT 0	㊻	O	Serial communication data to timer microprocessor. V period "L" pulse.
S CLK	㊼	I	Serial communication clock from timer microprocessor. V period "L" pulse.

5-5. SYSTEM CONTROL — AUDIO BLOCK INTERFACE (MA-316 BOARD IC160)

Signal	Pin No.	I/O	STOP/FF/ REW	TAPE LOADING	TAPE UNLOADING	PB	PB PAUSE	SLOW	x 2	CUE	REVIEW	REC	REC PAUSE
AF ENV	㊾	I	AF RF envelope signal input terminal for automatic tracking.										
A MUTEN	㉛	O (O.D)	L	L	L	*1	H	H	H	H	H	L	L
AF REC $\overline{\text{P}}$	②	O	L	L	L	L	L	L	L	L	L	H	L
AF SWP	⑱	O	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1	*1
FULL ERS	㊱	O (O.D)	H	H	H	H	H	H	H	H	H	L	H

*1. 25 Hz 50 % duty pulse approx. 5 msec delayed from RF SW P.

5-6. SERVO/SYSTEM CONTROL MICROPROCESSOR PIN FUNCTIONS (MA-316 BOARD IC160)

Pin No.	Pin Name	I/O	Function
1	RF SWP	O	RF switching pulse output.
2	AF REC $\overline{P}$	O	"H" when HiFi audio REC.
3	N.C.	—	Not used.
4	QVD	O	Quasi VD pulse output.
5	AUTO PRESET	O	"H" during auto preset.
6	FE ON	O	Flying erase ON/OFF
7	REC CTL	O	REC CTL signal output.
8	CTL RESET	O	Capstan current control. "H" during slow mode.
9	CAM 2	I	Cam motor control.
10	N.C.	—	Not used.
11	TA MUTE	O	Tuner audio mute. H: Mute
12	SECAM DET	I	"H" when the SECAM signal is detected.
13	NT JUDGE	I	4.43/3.58 judge input.
14	MESECAM DET	I	"H" when the MESECAM signal is detected.
15	CIN (REC PRE)	I	Erasing protection tab, cassette in detection signal input.
16	AV CONT	O	TV/VTR.
17	C+ DET	I	CANAL + detection.
18	SW1	O	BG/L control signal.
19	MODE 4	I	Cam encoder signal input.
20	MODE 3	I	Cam encoder signal input.
21	MODE 2	I	Cam encoder signal input.
22	MODE 1	I	Cam encoder signal input.
23	POWER SAVE CONT 1	O	–30V Power supply control.
24	POWER SAVE C+	O	C+ IC Power supply control.
25	MOD CONT	O	Tuner modulation output control signal.
26	SECAM ON	O	SECAM control signal output.
27	N.C.	—	Not used.
28	SDA 0	I/O	I^2C data.
29	N.C.	—	Not used.
30	SCL 0	I/O	I^2C clock.
31	A MUTE	O	"H" when audio mute.
32	T/E LED	O	Tape top/end sensors driver.
33	N.C.	—	Not used.
34	N.C.	—	Not used.
35	$\overline{\text{CAP STOP}}$	O	Capstan stop signal output.
36	FULL ERS	O	Full erase control.
37	N.C.	—	Not used.
38	N.C.	—	Not used.
39	MP	I	Fixed to "L".
40	$\overline{\text{ASURA RESET}}$	I	System reset signal.
41	VSS	—	Ground.
42	XTAL	O	System clock 16MHz.
43	EXTAL	I	System clock 16MHz.
44	$\overline{\text{ASURA CS}}$	I	Servo/system control microcomputer chip select signal.
45	S IN 0	I	Serial communication signal.
46	S OUT 0	O	Serial communication signal.
47	SCLK	I	Serial communication signal.
48	N.C.	—	Not used.
49	N.C.	—	Not used.
50	N.C.	—	Not used.

Pin No.	Pin Name	I/O	Function
51	SW2	O	BG/L' control signal.
52	AVSS	—	Unswitched ground.
53	AVREF	—	AD port reference input UNSW 5V.
54	AVDD	—	UNSW 5V.
55	NTPB SW	I	NTSC playback switch.
56	AV ADJ	I	Adjustment mode.
57	FOLLOW TV	I	Synchro-TP detection signal.
58	GND	—	Ground.
59	AF ENV	I	HiFi audio playback signal envelope.
60	RF ENV	I	Video playback signal envelope.
61	T SENS	I	Take-up end sensor.
62	S SENS	I	Supply end sensor.
63	S REEL FG	I	Supply reel FG input.
64	T REEL FG	I	Take-up reel FG input.
65	N.C.	—	Not used.
66	CSYNC	I	Composite sync. signal input.
67	$\overline{\text{PB CTL}}$	I	Playback CTL input.
68	DRM PG	I	Drum PG input.
69	DRM FG	I	Drum FG input.
70	CAP FG	I	Capstan FG input.
71	SECAM MIX	O	SECAM MIX control.
72	CAP RVS	O	Capstan reverse control "H" when reverse.
73	CAP DA	O	Capstan error D/A output.
74	DRM DA	O	Drum PG output.
75	CTL REC	—	Not used.
76	CTL STEP	—	Not used.
77	REC COUNT	I	Counter signal input when recording.
78	GND	—	Ground.
79	DNR RESET	O	DNR reset signal.
80	DATA (SSB)	O	Serial communication data.
81	CLOCK (SSB)	O	Serial communication clock.
82	N.C.	—	Not used.
83	N.C.	—	Not used.
84	CAP TRQ PWM	O	PWM output for capstan torque control.
85	N.C.	—	Not used.
86	N.C.	—	Not used.
87	N.C.	—	Not used.
88	VSS	—	Ground.
89	VDD	—	5V.
90	5V	—	5V.
91	N.C.	—	Not used.
92	CTL HYS HIGH	O	CTL amp gain control.
93	N.C.	—	Not used.
94	N.C.	—	Not used.
95	N.C.	—	Not used.
96	REC	O	"H" output when hifi audio recording.
97	N.C.	—	Not used.
98	N.C.	—	Not used.
99	STEP PLS	O	Step pulse "H" when capstan step driving.
100	AF SWP	O	AF switching pulse output.

5-7. TUNER/TIMER MODE CONTROL PIN FUNCTIONS (FR-128 BOARD IC180)

Pin No.	Pin Name	I/O	Function
1	TXT RST	O	Teletext IC (ML Board IC950) reset signal
2	N.C.	—	
3	LANC IN (SENSOR)	I	Lanc input
4	LANC OUT (SENSOR)	O	Lanc output
5	N.C.	—	
6	SIRCS IN	I	Remote control input
7	EEP DATA	I/O	I^2C bus interface data input/output
8	EEP SCL	I/O	I^2C bus interface clock input/output
9	SDA	I/O	I^2C bus interface data input/output
10	SCL	I/O	I^2C bus interface clock input/output
11	$\overline{\text{FDP CS}}$	O	FLD driver chip select
12	$\overline{\text{LED CS}}$	O	LED driver chip select
13	X-UCOM $\overline{\text{CS}}$	O	ML IC chip select(ML board IC902)
14	N.C.	—	
15	VSS	—	Ground
16	TU ENABLE	O	Tuner chip select
17	PLL CLK	O	Tuner PLL clock
18	PLL DATA	O	Tuner PLL data
19	OSD $\overline{\text{CS}}$	O	OSD IC (MA-316 board IC660) chip select
20	N.C.	—	
21	$\overline{\text{ASURA RESET}}$	O	S/S micon (MA-316 board IC160) reset signal
22	$\overline{\text{ASURA CS}}$	O	S/S micon (MA-316 board IC160) chip select signal
23	POWER CONT	O	Main power supply control signal
24	POWER CONT	O	Secondary power supply control signal
25	N.C	—	
26	OPTION 1	O	ML board IC950 enable signal
27	OPTION 2	I	ML board IC950 busy signal
28	N.C.	—	
29	OPTION 3	—	ML
30	N.C.	—	
31	N.C.	—	
32	Not used	—	Positive supply voltage
33	Not used	—	Positive supply voltage
34	Not used	—	Positive supply voltage
35	SI (TO CME)	I	Serial data input
36	SO (FROM CME)	O	Serial data output
37	SCLK	I/O	SCLK
38	N.C.	—	
39	N.C.	—	
40	$\overline{\text{RST}}$	I	System reset
41	VSS	—	Ground
42	XTAL	O	Internal oscillator output for 20MHz crystal
43	EXTAL	I	Internal oscillator 20MHz crystal input
44	VDD	—	Positive supply voltage
45	N.C.	—	
46	N.C.	—	
47	OSD SO (FROM CME)	O	Serial data output

Pin No.	Pin Name	I/O	Function
48	OSD CLK	O	Serial clock input/output
49	N.C.	—	
50	N.C.	—	
51	N.C.	—	
52	N.C.	—	
53	VDD	—	Positive supply voltage
54	TEX	I	Internal oscillator 32kHz crystal input
55	TX	O	Internal oscillator output for 32kHz crystal
56	VSS	—	Ground
57	AV LINK OUT	O	AV LINK output
58	SIRCS OUT	O	Remote control output
59	N.C.	—	
60	N.C.	—	
61	N.C.	—	
62	$\overline{\text{BUZZER}}$	O	Buzzer output/clock crystal frequency division output
63	POWER FAIL	I	Power voltage drop detection pin
64	Not used	—	Positive supply voltage
65	Not used	—	Positive supply voltage
66	$\overline{\text{CGV}}$	I	Vertical synchro detection
67	PDC DAV	I	VPS/PDC acknowledge signal
68	Not used	—	Positive supply voltage
69	AV LINK IN	I	AV LINK input
70	Not used	—	Positive supply voltage
71	Not used	—	Positive supply voltage
72	A/D0	I	Key pad reading
73	A/D1	I	Key pad reading
74	A/D2	I	Key pad reading
75	A/D3	I	Key pad reading
76	A VSS	—	Ground
77	A VREF0	—	Positive supply voltage
78	A VREF1	—	Positive supply voltage
79	A VDD	—	Positive supply voltage
80	A/D4	I	Key pad reading
81	A/D5	I	Key pad reading
82	A/D6	—	
83	Not used	—	
84	DMS1	I	
85	DMS2	I	
86	AFT	I	Ground wave tuner AFT detection
87	HDET	I	HDET signal input
88	VDD	—	Positive supply voltage
89	VDD	—	Positive supply voltage
90	VSS	—	Ground
91	N.C.	—	
92	N.C.	—	
93	N.C.	—	
94	N.C.	—	
95	N.C.	—	
96	N.C.	—	
97	N.C.	—	
98	N.C.	—	
99	EEP MODE	O	EEP mode control
100	0X-UCOM RST	O	X-UCOM reset signal (IC902 ML board)

SECTION 6
ADJUSTMENTS

6-1. MECHANICAL ADJUSTMENTS

For the mechanical adjustments, please refer to the "VHS MECHANICAL ADJUSTMENT MANUAL Ⅵ (S MECHANISM)" (9-921-647-11).

6-2. ELECTRICAL ADJUSTMENTS

See the adjustment parts location diagram on page 6-6 for the adjustment.

2-1. PREPARATION BEFORE ADJUSTMENT

2-1-1. Equipment Required

The measuring instruments used for this alignment include:

1) Monitor TV
2) Oscilloscope, dual-trace, bandwidth of 30MHz or more, with delay mode (A probe 10:1 should be used unless otherwise specified.)
3) Frequency counter
4) Pattern generator
5) Digital voltmeter
6) Audio generator
7) Audio level meter
8) Audio distortion meter
9) Audio attenuator
10) Alignment tapes
    KRV-51P Part No. : 8-192-605-36

2-1-2. Equipment Connection

Unless otherwise specified, connect and adjust the measuring instruments as shown in the following diagram.

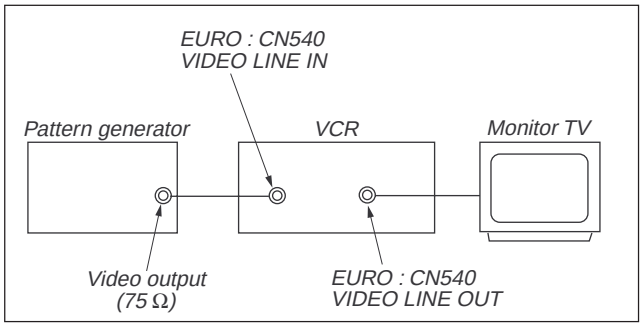


Fig. 6-2-1

2-1-3. Input Signal Check

Video signal produced by a pattern generator is used as an adjustment signal to perform electrical alignment for this unit. This video signal must satisfy the specification.

Unless otherwise specified, place the switches and controls of this unit in the following positions:

• INPUT SELECT switch ..... LINE 1

Connect an oscilloscope to the Video Input terminal. Check that the synchronizing signal of the Y signal has an amplitude of approximately 0.7V and that the burst signal has an amplitude of approximately 0.3V and its waveform is flat. And check that the level ratio of burst signal to "red" signal is 0.30 : 0.66. The video signal (color bar) used for electrical aligning this unit is shown in Fig. 6-2-2.

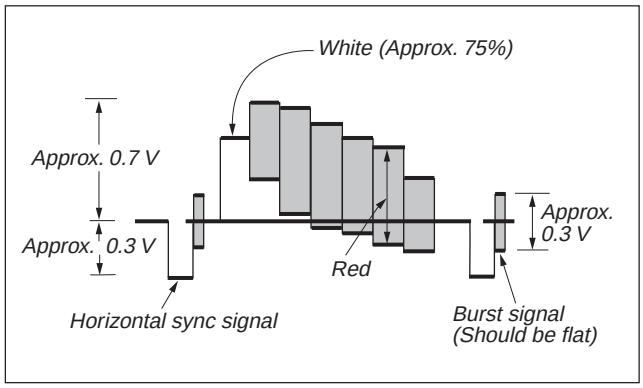


Fig. 6-2-2 Color Bar Signals of Pattern Generator

2-1-4. Alignment Tape

• Contents of KRV-51P

	Mode	Period	Video signal	Audio signal	
				Hi-Fi	Normal
1	SP	7 minutes	Color bar	400Hz (L/R)	400Hz
2		3 minutes	Monoscope		
3	LP	7 minutes	Color bar		
4		3 minutes	Monoscope		

2-1-5. Input/Output Levels and Impedance

Video input: LINE IN
EURO
Input signal: 1Vp-p, 75ohms, unbalanced, sync negative

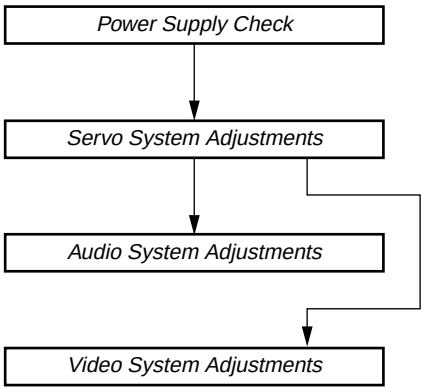
Video output: LINE OUT
EURO
Output signal: 1Vp-p, 75ohms, unbalanced, sync negative

Audio input: LINE IN
EURO
Input level: –7.5 dBs
(0dBs= 0.775Vrms)
Input impedance: more than 47 kilohms

Audio output: LINE OUT
EURO
Standard level: –7.5dBs at load impedance 47 kilohms
Output impedance: less than 10 kilohms

2-1-6. Adjustment Sequence

The adjustments should be performed in the following sequence.



2-2. POWER SUPPLY CHECK

2-2-1. Output Voltage Check (MA-316 Board)

Mode	E-E
Measuring Instrument	Digital voltmeter
TUNER 30V Check	
Measurement point	D702 Cathode
Specified value	33 ± 2V
VCC 12V Check	
Measurement point	IC530 Pin ②
Specified value	12.0 ± 0.3V
D 5V Check	
Measurement point	D160 Cathode
Specified value	5.2 ± 0.3V

[Check Method]

1) Each of these supply voltages must meet its specified value.

2-3. SERVO SYSTEM CHECK

Unless otherwise specified, set the switches to the following positions.

- INPUT SELECT switch ..... LINE 1
- TAPE SPEED switch ..... SP

2-3-1. RF Switching Position/ AF Switching Position Adjustments (MA-316, RP-231 Boards)

[Adjustment Purpose]

To adjust the link of the A-ch and B-ch of the tape playback outputs. To make the unit compatible with other tapes and units. If this specification is not satisfied, the link will appear on the screen and the screen will be disrupted, etc.

Mode	Playback
Signal	Alignment tape: SP color bar portion
Measurement point	CH1: Video LINE OUT (RF switching position) CN341 pin ① (HF ADJ) (AF switching position) (RP-231 board) CH2: CN261 pin ③ (RF SWP) (RP-231 board)
Measuring instrument	Oscilloscope
Specified value	6.5 ± 0.5H (416 ± 32 μsec)

[Adjustment Method]

1) Short-circuit between pin ⑤ (AV ADJ) and ③ (GND) of CN261 for about 1 second to activate the RF switching position adjustment mode.
2) Check that "AF" is indicated on FL display.
3) Using the program + and – buttons, adjust to 416 ± 32µsec (6.5 ± 0.5H).
4) Press the PAUSE button.
5) The set goes to the AF switching position adjustment mode.

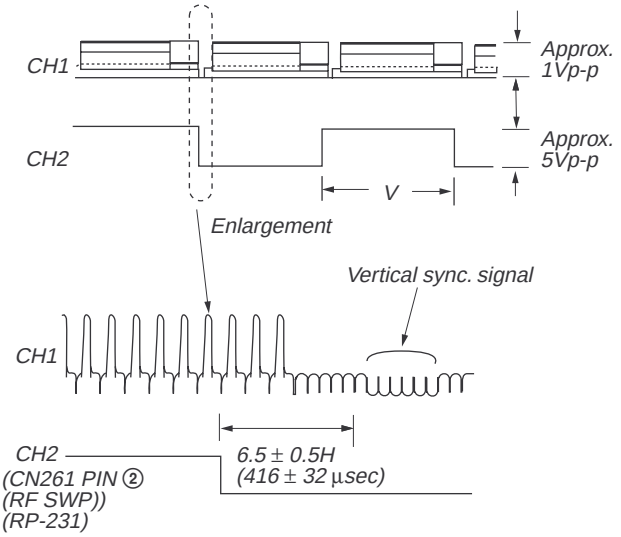


Fig. 6-2-3

6) Check that "AH" is indicated on FL display.
7) Using the program + and – buttons, minimize a chipped portion. At this time, confirm that a noisy sound is not heard.
8) Press the PAUSE button.
9) Press the EJECT button.

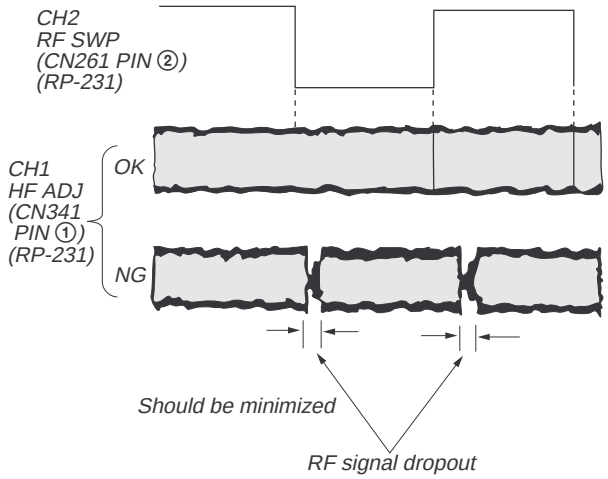


Fig. 6-2-4

2-4. VIDEO SYSTEM CHECKS

For the video system checks, follow the checking procedures given below as a rule. The color bar video signal supplied from the pattern generator is used as the video input signal for the video system adjustment of the recording mode. Check that the signal satisfies the specified value designated in the "Check of input signal" (Fig. 6-2-2)

Unless otherwise specified, set the switches to the following positions.

- INPUT SELECT switch ..... LINE 1
- TAPE SPEED switch ..... SP

[Checking Sequence]

1) X'tal OSC Check
2) SYNC AGC Check
3) White clip/Dark clip Check
4) Recording Y Level Check
5) Recording Chroma Level Check
6) Playback Level Check

2-4-1. X'tal OSC Check (MA-316 Board)

Mode	Playback
Signal	Alignment tape: SP Color bar portion
Measurement point	Q211 Emitter
Measuring instrument	Oscilloscope and Frequency counter
Specified value	4,433,619 ± 96Hz

Note: A frequency counter should be connected through a buffer amplifier (oscilloscope, etc.) having a high impedance and a low capacitance.

[Check Method]

1) Check that the oscillation frequency satisfies the specified value and that the oscillation voltage is 500 ± 200mVp-p.

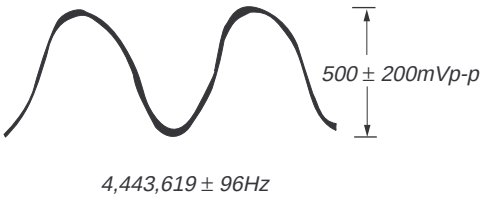


Fig. 6-2-5

2-4-2. SYNC AGC Check (MA-316 Board)

Mode	E-E
Signal	Color bar
Measurement point	IC201 pin ㊳
Measuring instrument	Oscilloscope
Specified value	A=2.1 ± 0.1Vp-p

[Check Method]

1) Check that the Video signal level (A) satisfies the specified value.

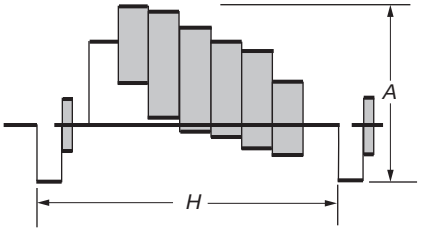


Fig. 6-2-6

2-4-3. White Clip/Dark Clip Check (MA-316 Board)

Mode	E-E
Signal	Color bar
Measurement point	IC201 pin ㊲
Measuring instrument	Oscilloscope
Specified value	White clip : 190 ± 15% Dark clip : 58.5 ± 5%

Connect a resistor of 3.3kΩ between IC201 pin ㊷ and GND.

[Check Method]

1) Check that the white clip level is 190 ± 15% to the white (100%) level.
2) Check that the dark chip level is 58.5 ± 5% to the white (100%) level.

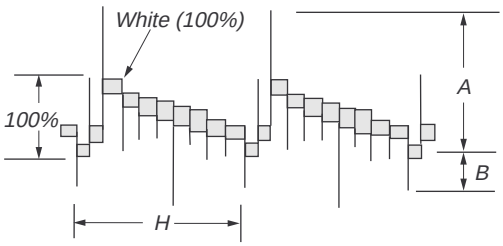


Fig. 6-2-7

2-4-4. Recording Y Level Check (MA-316 Board)

Mode	E-E
Signal	No-signal
Measurement point	IC201 pin ⑱
Measuring instrument	Oscilloscope
Specified value	A=307 ± 50mVp-p

[Check Method]

1) Check that the recording RF signal satisfies the specified value.

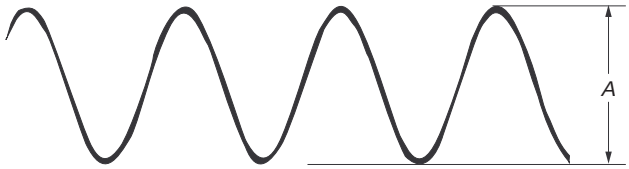


Fig. 6-2-8

2-4-5. Recording Chroma Level Check (MA-316 Board)

Mode	Recording
Signal	Color bar
Measurement point	IC201 pin ⑭
Measuring instrument	Oscilloscope
Specified value	A=350 ± 40mV

[Check Method]

1) Confirm the amplitude of recording chroma level becomes the specified value.

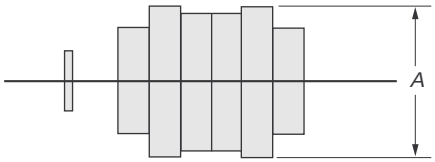


Fig. 6-2-9

2-4-6. Playback Level Check (MA-316 Board)

Mode	Playback
Signal Alignment	Alignment tape : SP mode color bar portion
Measurement point	Video LINE OUT terminal
Measuring instrument	Oscilloscope
Specified value	A=1.0 ± 0.1Vp-p (75Ω terminated)

[Check Method]

1) Check that the playback level satisfies the specified value.

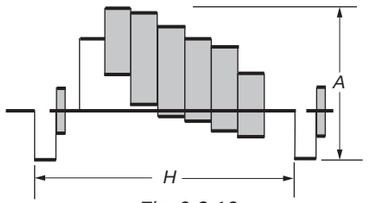


Fig. 6-2-10

2-5. AUDIO SYSTEM ADJUSTMENT

- For the adjustment of the audio system, perform in the SP mode if there is no special notes. Use the alignment tape.

[Connecting Instruments]

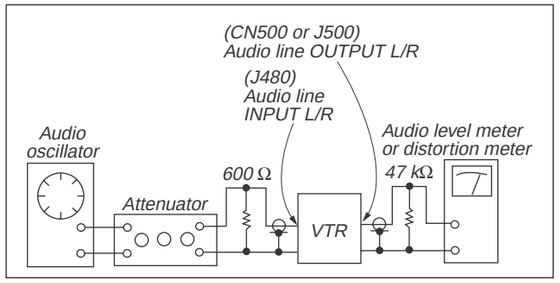


Fig. 6-2-11

- Adjust in the SP mode if there is no special indications.
- Perform the adjustment setting the switch on the following positions.
- INPUT SELECT switch ..... LINE IN 2

[Adjustment Method]

1. ACE head adjustment.....Refer to the VHS mechanical adjustment manual Ⅵ.
2. E-E output level check
3. Overall Output level and distortion factor check
4. Overall noise level check.

2-5-1. ACE Head Adjustment

Refer to the "VHS mechanical adjustment manual Ⅵ" (9-921-647-11).

2-5-2. E-E Output Level Check

Mode	E-E
Signal	400Hz, –7.5dBs : J480 (LINE IN 2) on FR-128 board
Measurement point	J500 (AUDIO OUT), CN500 (LINE 1)
Measuring instrument	Audio level meter
Specified value	J500 : –7.5 ± 2.0dBs, CN500 : –6.3 ± 2.0dBs

[Check Method]

1) Input signal of 400Hz and –7.5dBs to J480 (LINE IN 2).
2) Check that the audio output level is the specified value.

2-5-3. Overall Output Level and Distortion Factor Check

Mode	Self-record playback
Signal	400Hz, –7.5dBs : J480 (LINE IN 2) on FR-128 board
Measurement point	CN500 (LINE 1) Pin ③ (L), Pin ① (R)
Measuring instrument	Audio level meter and Distortion meter
Specified value	Playback Level: –6.3 ± 3dBs Distortion: 4.0% or less

[Check Method]

1) Input signal of 400Hz and –7.5dBs to J480 (LINE IN 2).
2) Record signal.
3) Playback the recorded portion.
4) Check that the output level is –6.3 ± 3dBs.
5) Check that the distortion factor is 4.0% or less.

2-5-4. Overall Noise Level Check

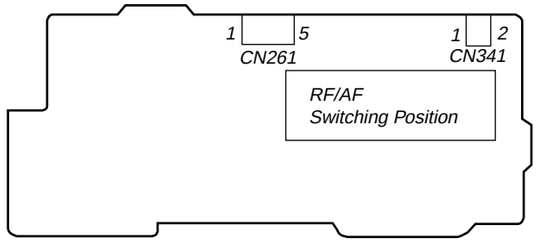
Mode	Self-record playback
Signal	No signal (Insert a shorting plug into the Audio LINE IN terminal)
Measurement point	CN500 (LINE 1) Pin ③
Measuring instrument	Audio level meter (IHF-A weighing filter is used)
Specified value	– 45.5dBs or less

[Check Method]

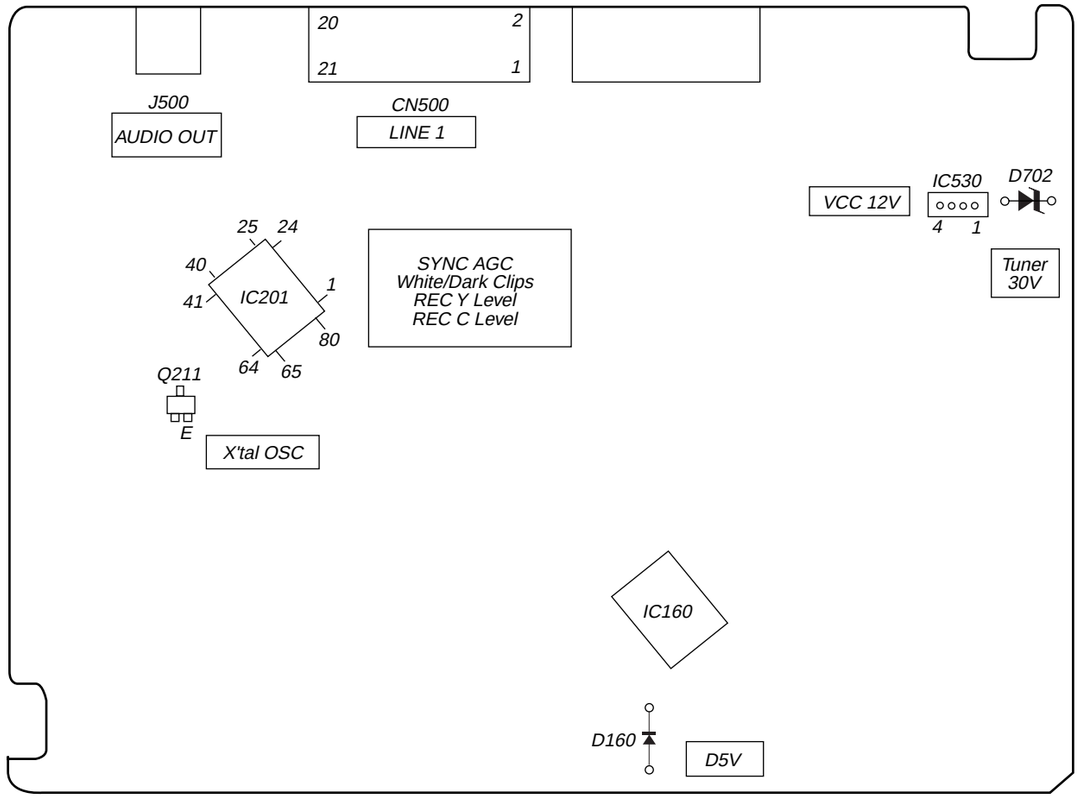
1) Record.
2) Playback recorded portion.
3) Check that noise level is – 45.5dBs or less.

2-6. ADJUSTMENT PARTS LOCATION DIAGRAM

RP-231 BOARD (Conductor side)



MA-316 BOARD (Conductor side)



SECTION 7
REPAIR PARTS LIST

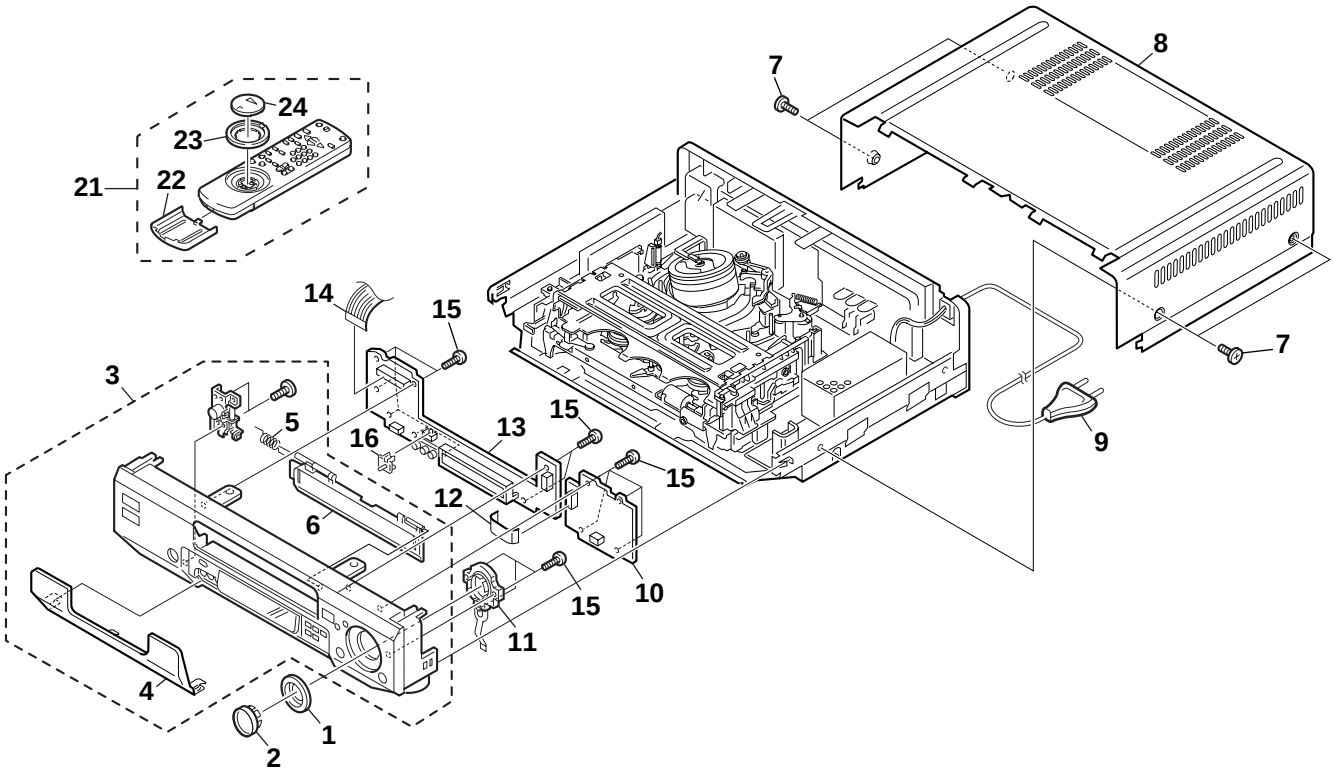
7-1. EXPLODED VIEWS

Note:

- -XX, -X mean standardized parts, so they may have some differences from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

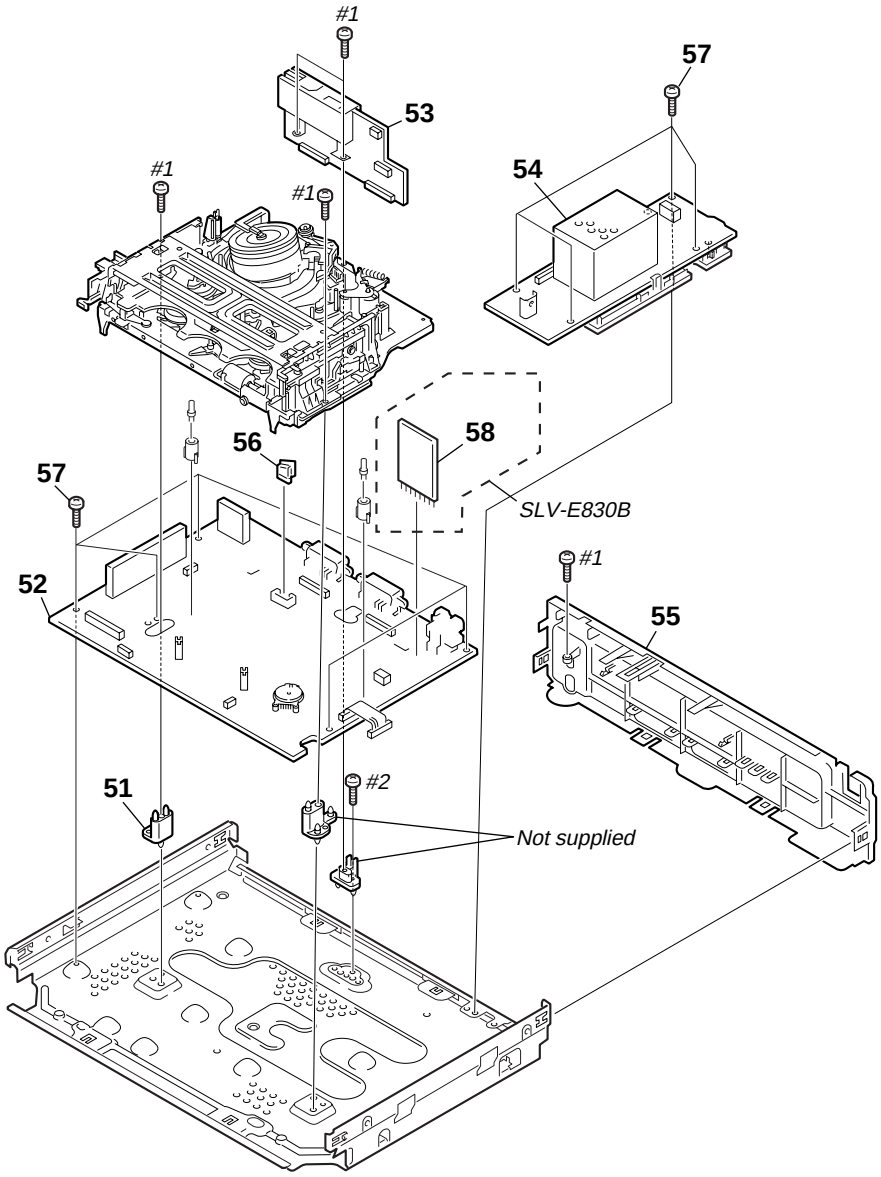
7-1-1. FRONT PANEL ASSEMBLY AND UPPER CASE SECTION



Ref. No.	Part No.	Description	Remarks
1	3-979-310-21	RING (AV), JO	
2	3-979-309-21	BUTTON (AV), CENTER (NP,VC1,VC2)	
2	3-979-309-31	BUTTON (AV), CENTER (B)	
3	X-3948-225-1	PANEL ASSY, FRONT (VC1,VC2)	
3	X-3948-402-1	PANEL ASSY, FRONT (B)	
3	X-3948-403-1	PANEL ASSY, FRONT (NP)	
4	X-3948-226-1	DOOR ASSY, FRONT	
5	3-953-432-01	SPRING (GE), FL	
6	3-979-302-21	DOOR (AV), CASSETTE	
* 8	3-987-684-21	CASE (BN), UPPER	
⚠9	1-782-012-11	CORD, POWER	
* 10	A-6794-519-A	DM-73 BOARD, COMPLETE	
11	1-762-844-31	SWITCH, ROTARY	
12	1-783-169-11	CABLE, FLAT (FFD-2)	

Ref. No.	Part No.	Description	Remarks
* 13	A-6791-533-A	FR-128 BOARD, COMPLETE (VC1,VC2)	
* 13	A-6791-535-A	FR-128 BOARD, COMPLETE(B)	
* 13	A-6794-520-A	FR-128 BOARD, COMPLETE(NP)	
14	1-783-167-11	CABLE, FLAT (FFM-18)	
15	3-968-554-01	SCREW (WN1411 D2.5 EJOT K25)	
16	3-987-691-01	KNOB, SLIDE	
21	1-475-564-11	COMMANDER, STANDARD (RMT-V224) (NP,VC1,VC2)	
21	1-475-564-31	COMMANDER, STANDARD(RMT-V224B) (B)	
22	3-709-126-01	COVER, BATTERY	
23	3-972-783-21	RING, JOG	
24	3-972-850-01	BUTTON, FUNCTION (NP,VC1,VC2)	
24	3-972-850-21	BUTTON, FUNCTION (B)	

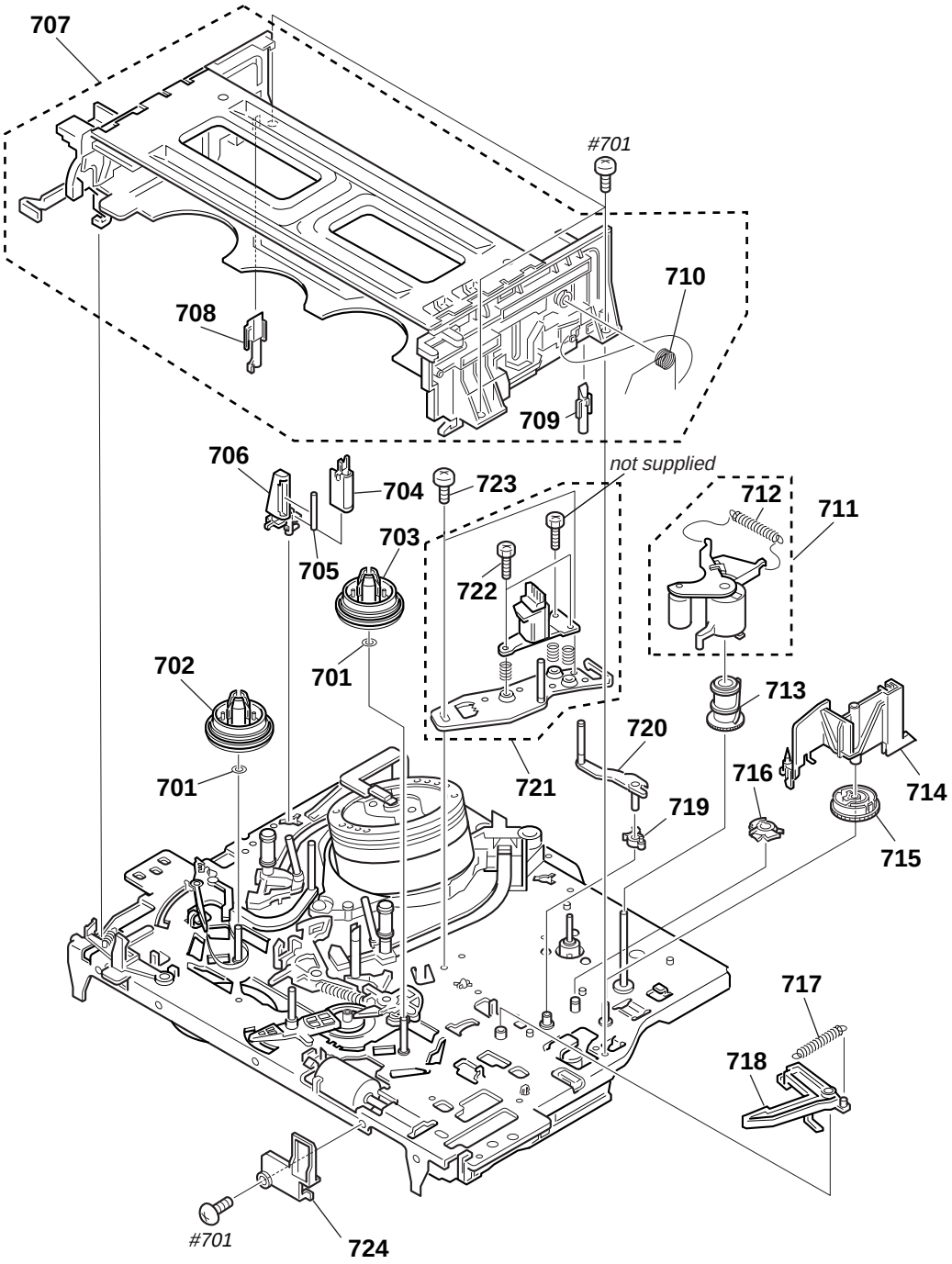
7-1-2. CHASSIS SECTION



Ref. No.	Part No.	Description	Remarks
51	3-959-381-01	BASE (L), MD	
* 52	A-6791-536-A	MA-316 BOARD, COMPLETE (NP)	
* 52	A-6791-530-A	MA-316 BOARD, COMPLETE (VC1,VC2)	
* 52	A-6791-534-A	MA-316 BOARD, COMPLETE (B)	
* 53	A-6791-531-A	RP-231 BOARD, COMPLETE	
⚠54	1-468-273-11	POWER BLOCK	
* 55	3-987-710-61	PANEL (BN), REAR	
56	1-779-725-11	CONNECTOR, BOARD TO BOARD 5P	
57	3-970-608-21	SUMITITE (B3), +BV	
* 58	A-6791-537-A	SE-69 BOARD, COMPLETE (B)	

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

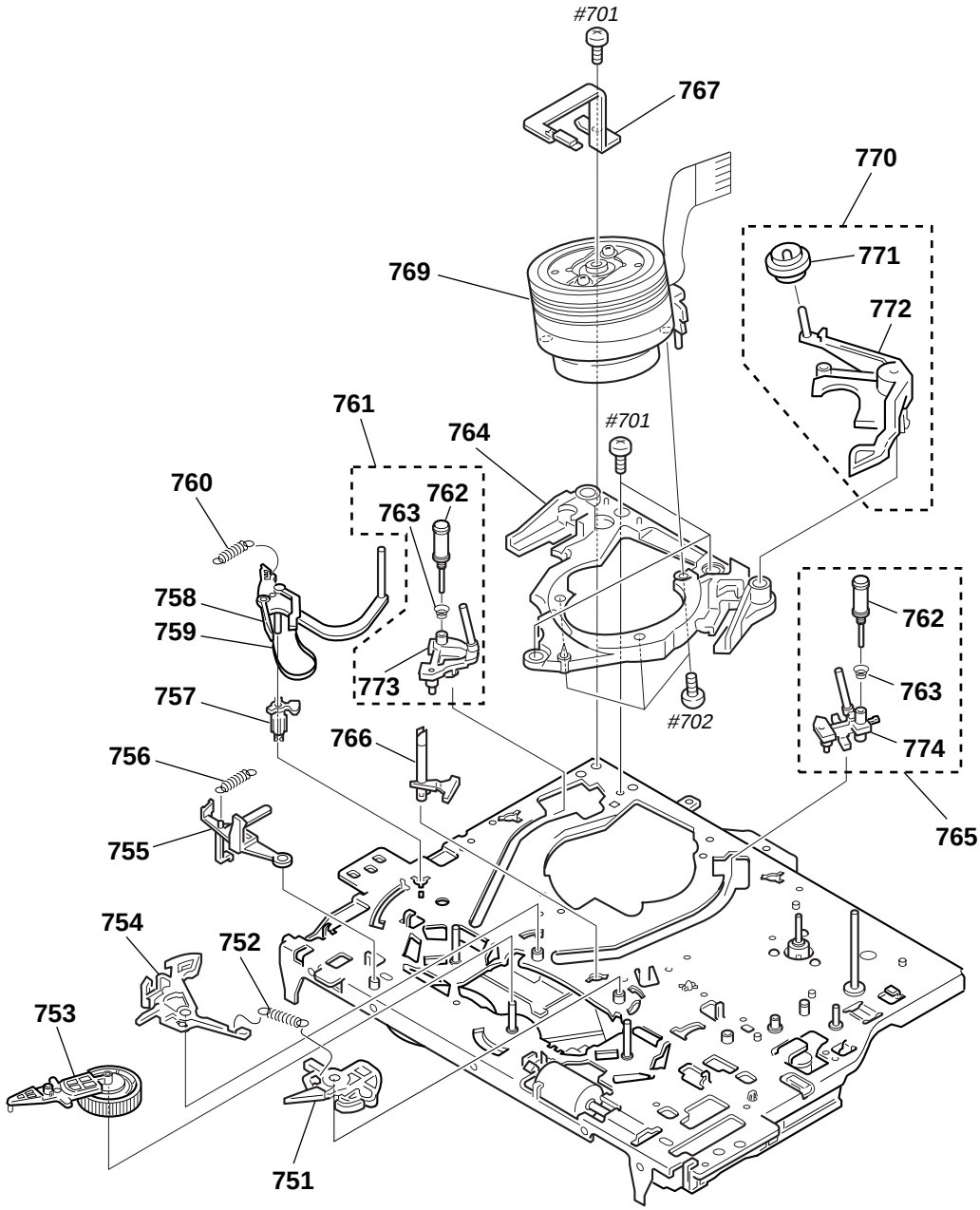
7-1-3. MECHANISM DECK-1



Ref. No.	Part No.	Description	Remarks
701	3-977-509-01	WASHER, THRUST	
702	3-977-507-01	TABLE, REEL (S) (GRAY)	
703	3-977-508-01	TABLE, REEL (T) (BLACK)	
704	1-500-144-11	HEAD, FE	
705	3-977-495-01	SHAFT TG2	
706	3-977-494-01	HOLDER, FEH	
707	A-6759-619-C	FL COMPLETE ASSY	
708	3-977-535-01	PLATE, LUMINOUS(END SENSOR)	
709	3-977-536-01	PLATE, LUMINOUS(TOP SENSOR)	
710	3-970-471-01	SPRING (DECK OPEN), TORSION	
711	A-6759-615-A	PRESS BLOCK ASSY, PINCH	
712	3-958-455-01	SPRING (PINCH), TENSION	

Ref. No.	Part No.	Description	Remarks
713	3-977-447-01	GEAR, ELEVATOR	
714	3-977-514-01	OPENER, LID	
715	3-977-441-01	GEAR, PINCH PRESSING	
716	3-977-445-01	GEAR, TG8 ARM DRIVING	
717	3-977-465-01	SPRING,EXTENSION(RVS BRAKE)	
718	X-3947-582-1	ARM ASSY, RVS BRAKE	
719	3-977-446-01	GEAR, TG8 ARM	
720	X-3947-590-1	TG8 ASSY	
721	A-6759-620-A	HEAD BLOCK ASSY, ACE (TDK)	
722	3-974-556-01	+ HEXA TT 2.6X9 (TAPER)	
723	3-979-508-01	SCREW	
724	3-978-485-01	PLATE, GUIDE CASSETTE	

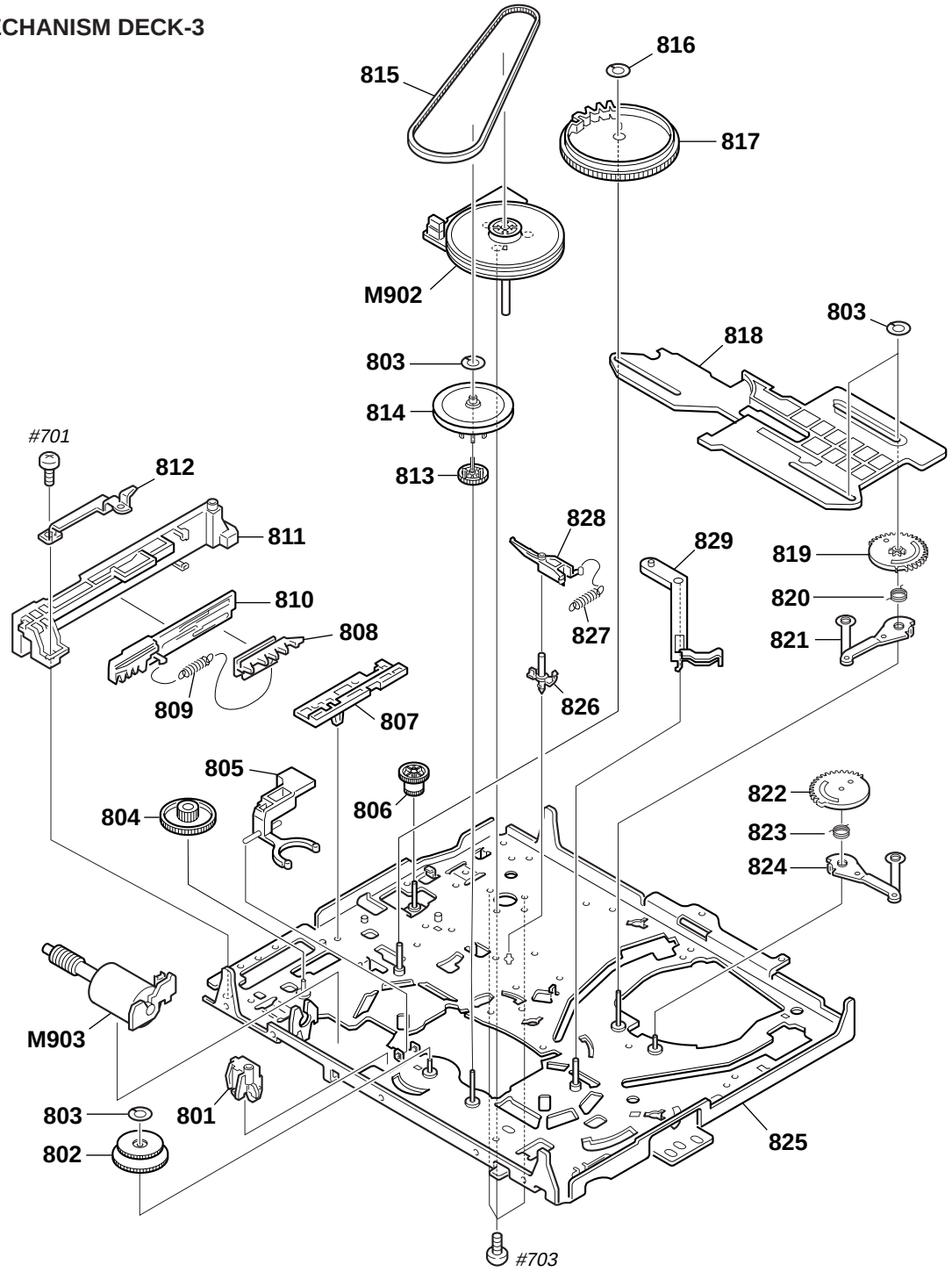
7-1-4. MECHANISM DECK-2



Ref. No.	Part No.	Description	Remarks
751	X-3947-581-1	BRAKE ASSY,MAIN(T)	
752	3-977-462-01	SPRING,EXTENTION. (MAIN BRAKE)	
753	X-3947-573-1	ARM ASSY, PENDULUM	
754	X-3947-580-2	BRAKE ASSY, MAIN(S)	
755	3-977-513-02	LEVER, REC. PROOF	
756	3-976-767-01	SPRING, TENS. (REC. PROOF)	
757	3-977-487-01	BOSS, TG1 FULCRUM	
758	X-3947-587-1	TG1 ASSY	
759	X-3947-589-1	BAND ASSY, TG1	
760	3-977-488-01	SPRING (POWER TENSION)	
761	A-6750-324-E	SHUTTLE (S) BLOCK ASSY	
762	X-3944-378-2	ROLLER ASSY, GUIDE	
763	3-965-178-01	SPRING	

Ref. No.	Part No.	Description	Remarks
764	3-969-632-04	BASE, DRUM	
765	A-6750-325-E	SHUTTLE (T) BLOCK ASSY	
766	3-977-501-01	PLATE, LUMINOUS	
767	X-3943-899-8	GROUND ASSY, SHAFT	
768	2-643-205-01	SCREW	
769	1-759-373-11	DRUM ASSY DZH-86A-R (NP,VC1,VC2)	
769	1-759-557-11	DRUM ASSY DZH-98A-R (B)	
770	A-6746-074-G	ROLLER BLOCK ASSY, HC	
771	X-3947-255-1	ROLLER ASSY, HC	
772	3-975-724-07	ARM, HC	
773	X-3946-855-1	SHUTTLE (S) ASSY	
774	X-3946-856-1	SHUTTLE (T) ASSY	

7-1-5. MECHANISM DECK-3



Ref. No.	Part No.	Description	Remarks
* 801	3-977-437-01	RETAINER,CAM MOTOR	
802	X-3947-584-1	ASSY, REEL DIRECT	
803	3-977-443-01	WASHER, STOPPER	
804	3-977-438-01	WORM - WHEEL	
805	3-977-506-01	ARM, LIMITTER SELECTION	
806	3-977-444-01	GEAR, PINCH TRANSMISSION	
807	3-977-515-01	GUIDE, FL SLIDER	
808	3-977-517-01	PLATE, SLIDE, FL	
809	3-977-519-01	SPRING, TENS. (LIMIT, FL)	
810	3-977-518-02	PLATE, LIMITTER, FL	
811	3-977-516-01	HOLDER, FL SLIDER	
812	3-977-877-01	PLATE, RETAINER	
813	3-977-504-01	GEAR, CLUTCH	
814	X-3947-585-1	GEAR ASSY, PULLEY	
815	3-977-510-01	BELT, RUBBER	
816	3-977-440-01	WASHER, STOPPER	

Ref. No.	Part No.	Description	Remarks
817	3-977-439-01	GEAR, CAM	
818	3-977-442-01	SLIDER	
819	3-977-455-01	GEAR, LOADING(T)	
820	3-977-456-03	SPRING, TORSION (LOAD T)	
821	X-3947-579-1	LEVER ASSY, LOADING(T)	
822	3-977-451-01	GEAR, LOADING(S)	
823	3-977-452-01	SPRING, TORSION (LOAD S)	
824	X-3947-578-1	LEVER ASSY, LOADING(S)	
825	X-3947-576-2	CHASSIS ASSY, MECHANICAL	
826	3-977-468-01	SHAFT, CAPSTAN BRAKE	
827	3-977-467-02	SPRING, CAP BRAKE	
828	X-3947-583-1	BRAKE ASSY, CAPSTAN	
829	3-977-489-01	ARM, TG1 DRIVING	
830	A-6759-616-A	GEAR BLOCK ASSY, LOADING	
M902	1-698-971-11	MOTOR, DC	
M903	X-3947-577-1	MOTOR ASSY, CAM	

7-2. ELECTRICAL PARTS LIST

Note:

When indicating parts by reference number, please include the board name.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- CAPACITORS:
  uF: µF
- RESISTORS
  All resistors are in ohms.
  METAL: metal-film resistor
  METAL OXIDE: Metal Oxide-film resistor
  F: nonflammable
- COILS
  uH: µH
- SEMICONDUCTORS
  In each case, u: µ, for example:
  uA...: µA... , uPA... , µPA... ,
  uPB... , µPB... , uPC... , µPC... ,
  uPD..., µPD...

Ref. No.	Part No.	Description			Remarks
*	A-6794-519-A	DM-73 BOARD, COMPLETE			
		**********			
					(Ref.No.:2,000 series)
		< CONNECTOR >			
CN451	1-784-484-11	CONNECTOR, FFC/FPC 5P			
CN452	1-784-453-11	CONNECTOR, FFC/FPC 11P			
		< DIODE >			
D459	8-719-056-06	DIODE SLR-342DCT31			
		< TRANSISTOR >			
Q450	8-729-424-08	TRANSISTOR UN2111			
		< RESISTOR >			
R459	1-216-033-00	METAL CHIP	220	5%	1/10W
R464	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R465	1-216-073-00	METAL CHIP	10K	5%	1/10W
R466	1-249-429-11	CARBON	10K	5%	1/4W
R467	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R468	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R469	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R470	1-216-073-00	METAL CHIP	10K	5%	1/10W
R471	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R472	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
		< SWITCH >			
S451	1-762-196-21	SWITCH, TACT (REC)			
S453	1-762-196-21	SWITCH, TACT (REW)			
S457	1-762-196-21	SWITCH, TACT (FF)			
S458	1-762-196-21	SWITCH, TACT (PAUSE)			
S459	1-762-196-21	SWITCH, TACT (JOG)			
*	A-6794-520-A	FR-128 BOARD, COMPLETE (NP)			
		**********			
*	A-6791-533-A	FR-128 BOARD, COMPLETE (VC1,VC2)			
		**********			
*	A-6791-535-A	FR-128 BOARD, COMPLETE (B)			
		**********			
					(Ref.No.:3,000 series)
		< BUZZER >			
BZ181	1-529-104-11	BUZZER, PIEZOELECTRIC			
		< CAPACITOR >			
C180	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C188	1-163-104-00	CERAMIC CHIP	30PF	5%	50V
C189	1-163-104-00	CERAMIC CHIP	30PF	5%	50V
C190	1-125-705-11	DOUBLE LAYER	0.22F	0	5.5V
C191	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C192	1-126-924-11	ELECT	330uF	20%	10V
C193	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C196	1-126-916-11	ELECT	1000uF	20%	6.3V
C198	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C199	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C200	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C400	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C421	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C422	1-124-589-11	ELECT	47uF	20%	16V
C423	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C424	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C481	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C491	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C493	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C495	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C496	1-163-038-91	CERAMIC CHIP	0.1uF		25V
		< CONNECTOR >			
CN181	1-784-514-11	CONNECTOR, FFC/FPC 35P			
CN400	1-784-453-11	CONNECTOR, FFC/FPC 11P			
* CN480	1-564-004-11	PIN, CONNECTOR 5P			
		< TRIMMER >			
CT180	1-141-227-00	CAP, TRIMMER 20PF			
		< DIODE >			
D186	8-719-200-82	DIODE 11ES2			
D187	8-719-200-82	DIODE 11ES2			
D400	8-719-056-07	DIODE SLR-342MCT31			
D420	8-719-110-08	DIODE RD8.2ES-B2			
D480	8-719-109-97	DIODE RD6.8ES-B2			
D481	8-719-108-12	DIODE RD9.1E-W			
D490	8-719-108-12	DIODE RD9.1E-W			
D491	8-719-108-12	DIODE RD9.1E-W			
		< IC >			
IC180	8-759-483-32	IC S579C15PJ-VSX9373 (NP,VC1,VC2)			
IC180	8-759-483-33	IC S579C15PJ-VSX9374 (B)			
IC182	8-759-432-34	IC ST24W16FM6TR			
IC183	8-759-248-87	IC MM1256XF-BE			
IC400	8-749-011-05	IC GP1U28X			
IC420	8-759-438-82	IC uPD16311GC-AB6			
		< JACK >			
J480	1-580-845-11	JACK, PIN 3P (LINE 2 IN)			

Ref. No.	Part No.	Description			Remarks
		< JUMPER RESISTOR >			
JR101	1-216-295-91	SHORT	0		
JR102	1-216-295-91	SHORT	0		
JR103	1-216-295-91	SHORT	0		
JR104	1-216-296-91	SHORT	0		
JR105	1-216-296-91	SHORT	0		
JR106	1-216-296-91	SHORT	0		
JR107	1-216-296-91	SHORT	0		
JR108	1-216-296-91	SHORT	0		
JR109	1-216-296-91	SHORT	0		
JR110	1-216-296-91	SHORT	0		
JR111	1-216-295-91	SHORT	0		
JR181	1-216-295-91	SHORT	0		
JR190	1-216-296-91	SHORT	0		
JR191	1-216-295-91	SHORT	0		
JR192	1-216-295-91	SHORT	0		
		< JUMPER RESISTOR >			
JS181	1-216-295-91	SHORT	0		
JS490	1-216-295-91	SHORT	0		
		< COIL >			
L182	1-414-934-21	INDUCTOR	10uH		
		< FLUORESCENT INDICATOR >			
ND420	1-517-745-21	TUBE, FLUORESCENT INDICATOR			
		< TRANSISTOR >			
Q400	8-729-421-19	TRANSISTOR	UN2213		
		< RESISTOR >			
R180	1-216-073-00	METAL CHIP	10K	5%	1/10W
R181	1-216-073-00	METAL CHIP	10K	5%	1/10W
R182	1-216-295-91	SHORT	0		
R183	1-216-295-91	SHORT	0		
R184	1-216-113-00	METAL CHIP	470K	5%	1/10W
R185	1-216-073-00	METAL CHIP	10K	5%	1/10W
R186	1-216-041-00	METAL CHIP	470	5%	1/10W
R187	1-216-041-00	METAL CHIP	470	5%	1/10W
R188	1-216-049-91	RES,CHIP	1K	5%	1/10W
R190	1-249-417-11	CARBON	1K	5%	1/4W F
R191	1-216-073-00	METAL CHIP	10K	5%	1/10W
R192	1-216-049-91	RES,CHIP	1K	5%	1/10W
R195	1-216-049-91	RES,CHIP	1K	5%	1/10W
R196	1-216-049-91	RES,CHIP	1K	5%	1/10W
R197	1-216-049-91	RES,CHIP	1K	5%	1/10W
R198	1-216-049-91	RES,CHIP	1K	5%	1/10W
R199	1-216-037-00	METAL CHIP	330	5%	1/10W
R201	1-216-295-91	SHORT	0		
R202	1-216-095-00	METAL CHIP	82K	5%	1/10W
R203	1-216-113-00	METAL CHIP	470K	5%	1/10W
R204	1-218-179-11	RES,CHIP	10M	5%	1/10W
R400	1-216-029-00	METAL CHIP	150	5%	1/10W
R401	1-216-089-91	RES,CHIP	47K	5%	1/10W
R402	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R403	1-216-073-00	METAL CHIP	10K	5%	1/10W

Ref. No.	Part No.	Description			Remarks
R404	1-216-073-00	METAL CHIP	10K	5%	1/10W
R405	1-216-073-00	METAL CHIP	10K	5%	1/10W
R406	1-216-073-00	METAL CHIP	10K	5%	1/10W
R407	1-216-073-00	METAL CHIP	10K	5%	1/10W
R408	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R409	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R410	1-216-073-00	METAL CHIP	10K	5%	1/10W
R411	1-216-081-00	METAL CHIP	22K	5%	1/10W
R415	1-216-075-00	METAL CHIP	12K	5%	1/10W
R416	1-216-073-00	METAL CHIP	10K	5%	1/10W
R417	1-216-295-91	SHORT	0		
R418	1-216-073-00	METAL CHIP	10K	5%	1/10W
R421	1-216-295-91	SHORT	0		
R422	1-216-049-91	RES,CHIP	1K	5%	1/10W
R423	1-216-049-91	RES,CHIP	1K	5%	1/10W
R424	1-216-049-91	RES,CHIP	1K	5%	1/10W
R425	1-216-085-00	METAL CHIP	33K	5%	1/10W
R426	1-216-073-00	METAL CHIP	10K	5%	1/10W
R427	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R428	1-216-073-00	METAL CHIP	10K	5%	1/10W
R429	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R430	1-216-073-00	METAL CHIP	10K	5%	1/10W
R480	1-216-022-00	METAL CHIP	75	5%	1/10W
R481	1-216-295-91	SHORT	0		
R490	1-216-295-91	SHORT	0		
R491	1-216-295-91	SHORT	0		
R492	1-216-035-00	METAL CHIP	270	5%	1/10W
R493	1-216-089-91	RES,CHIP	47K	5%	1/10W
R494	1-216-295-91	SHORT	0		
		< SWITCH >			
S400	1-762-196-21	SWITCH, TACT (ON/STANDBY)			
S401	1-762-196-21	SWITCH, TACT (PROGRAM/TRACKING:+)			
S402	1-762-196-21	SWITCH, TACT (AUTO SET UP)			
S404	1-762-196-21	SWITCH, TACT (PROGRAM/TRACKING:-)			
S406	1-762-196-21	SWITCH, TACT (QUICK TIMER)			
S407	1-762-196-21	SWITCH, TACT (EJECT)			
S408	1-762-196-21	SWITCH, TACT (AUDIO DUB)			
S411	1-571-588-31	SWITCH, SLIDE (POWER SAVE)			
		< VIBRATOR >			
X180	1-760-014-11	VIBRATOR, CERAMIC 20MHz			
X181	1-579-463-11	VIBRATOR, CRYSTAL 32.768kHz			
		**********			
*	A-6791-530-A	MA-316 BOARD, COMPLETE (VC1,VC2)			
		**********			
*	A-6791-534-A	MA-316 BOARD, COMPLETE (B)			
		**********			
*	A-6791-536-A	MA-316 BOARD, COMPLETE (NP)			
		**********			
		(Ref.No.:2,000 series)			
	1-558-924-21	CABLE, PIN			
*	3-960-273-01	SPACER, TOP END			
*	3-960-274-01	SPACER, LED			
		< CAPACITOR >			
C100	1-128-057-11	ELECT	330uF	20%	6.3V
C101	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C102	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C103	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C104	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V

MA-316

Ref. No.	Part No.	Description			Remarks
C105	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C107	1-130-489-00	MYLAR	0.033uF	5%	50V
C108	1-137-441-11	FILM	0.027uF	5%	50V
C109	1-126-157-11	ELECT	10uF	20%	16V
C130	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C131	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C132	1-124-589-11	ELECT	47uF	20%	16V
C134	1-124-463-00	ELECT	0.1uF	20%	50V
C159	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C160	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C161	1-124-589-11	ELECT	47uF	20%	16V
C162	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C164	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C165	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C166	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C167	1-124-589-11	ELECT	47uF	20%	16V
C170	1-126-154-11	ELECT	47uF	20%	6.3V
C172	1-164-346-11	CERAMIC CHIP	1uF		16V
C173	1-163-121-00	CERAMIC CHIP	150PF	5%	50V
C201	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C202	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C204	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C205	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C206	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C207	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C208	1-163-241-11	CERAMIC CHIP	39PF	5%	50V
C209	1-128-131-11	ELECT	22uF	20%	50V
C210	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C211	1-163-237-11	CERAMIC CHIP	27PF	5%	50V
C212	1-163-259-91	CERAMIC CHIP	220PF	5%	50V
C213	1-163-257-11	CERAMIC CHIP	180PF	5%	50V
C214	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C217	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C219	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C220	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C222	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C223	1-126-154-11	ELECT	47uF	20%	6.3V
C224	1-162-306-11	CERAMIC	0.01uF	30%	16V
C226	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C228	1-126-157-11	ELECT	10uF	20%	16V
C229	1-162-306-11	CERAMIC	0.01uF	30%	16V
C230	1-124-589-11	ELECT	47uF	20%	16V
C231	1-126-157-11	ELECT	10uF	20%	16V
C232	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C233	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C234	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C235	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C236	1-126-160-11	ELECT	1uF	20%	50V
C237	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C238	1-162-306-11	CERAMIC	0.01uF	30%	16V
C239	1-124-584-00	ELECT	100uF	20%	10V
C240	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C241	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C242	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C243	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C244	1-107-725-11	CERAMIC CHIP	0.1uF	10%	16V
C245	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C246	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C247	1-163-809-11	CERAMIC CHIP	0.047uF	10%	25V
C248	1-163-031-11	CERAMIC CHIP	0.01uF		50V(B)

Ref. No.	Part No.	Description			Remarks
C248	1-216-065-91	RES,CHIP	4.7K	5%	1/10W (NP,VC1,VC2)
C249	1-126-154-11	ELECT	47uF	20%	6.3V
C250	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C251	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C252	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C253	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C254	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C255	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C257	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C301	1-164-159-11	CERAMIC	0.1uF		50V
C302	1-126-154-11	ELECT	47uF	20%	6.3V
C305	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C306	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C307	1-126-157-11	ELECT	10uF	20%	16V
C308	1-124-589-11	ELECT	47uF	20%	16V
C309	1-126-163-11	ELECT	4.7uF	20%	50V
C310	1-163-011-11	CERAMIC CHIP	0.0015uF	10%	50V
C311	1-163-011-11	CERAMIC CHIP	0.0015uF	10%	50V
C312	1-137-370-11	FILM	0.01uF	5%	50V
C313	1-126-157-11	ELECT	10uF	20%	16V
C314	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C315	1-126-160-11	ELECT	1uF	20%	50V
C317	1-126-163-11	ELECT	4.7uF	20%	50V
C318	1-124-589-11	ELECT	47uF	20%	16V
C361	1-126-960-11	ELECT	1uF	20%	50V
C362	1-126-960-11	ELECT	1uF	20%	50V
C363	1-126-960-11	ELECT	1uF	20%	50V
C364	1-126-960-11	ELECT	1uF	20%	50V
C365	1-126-960-11	ELECT	1uF	20%	50V
C366	1-126-960-11	ELECT	1uF	20%	50V
C369	1-126-964-11	ELECT	10uF	20%	50V
C370	1-126-964-11	ELECT	10uF	20%	50V
C371	1-126-964-11	ELECT	10uF	20%	50V
C372	1-126-964-11	ELECT	10uF	20%	50V
C373	1-126-964-11	ELECT	10uF	20%	50V
C374	1-126-960-11	ELECT	1uF	20%	50V
C375	1-164-489-11	CERAMIC CHIP	0.22uF	10%	16V
C376	1-163-016-00	CERAMIC CHIP	0.0039uF	10%	50V
C377	1-126-967-11	ELECT	47uF	20%	50V
C378	1-126-964-11	ELECT	10uF	20%	50V
C379	1-126-961-11	ELECT	2.2uF	20%	50V
C380	1-126-964-11	ELECT	10uF	20%	50V
C381	1-126-967-11	ELECT	47uF	20%	50V
C382	1-163-016-00	CERAMIC CHIP	0.0039uF	10%	50V
C383	1-164-489-11	CERAMIC CHIP	0.22uF	10%	16V
C384	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C385	1-126-933-11	ELECT	100uF	20%	16V
C386	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C390	1-126-960-11	ELECT	1uF	20%	50V
C391	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C392	1-126-960-11	ELECT	1uF	20%	50V
C393	1-126-960-11	ELECT	1uF	20%	50V
C394	1-126-960-11	ELECT	1uF	20%	50V
C395	1-126-960-11	ELECT	1uF	20%	50V
C500	1-163-017-00	CERAMIC CHIP	0.0047uF	5%	50V
C501	1-163-017-00	CERAMIC CHIP	0.0047uF	5%	50V
C510	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C511	1-126-967-11	ELECT	47uF	20%	16V
C512	1-126-967-11	ELECT	47uF	20%	16V
C513	1-126-935-11	ELECT	470uF	20%	6.3V

Ref. No.	Part No.	Description			Remarks
C530	1-126-967-11	ELECT	47uF	20%	16V
C531	1-107-725-11	CERAMIC CHIP	0.1uF	10%	16V
C532	1-126-933-11	ELECT	100uF	20%	16V
C541	1-124-584-00	ELECT	100uF	20%	10V
C542	1-107-725-11	CERAMIC CHIP	0.1uF	10%	16V
C543	1-107-725-11	CERAMIC CHIP	0.1uF	10%	16V
C544	1-107-725-11	CERAMIC CHIP	0.1uF	10%	16V
C545	1-164-489-11	CERAMIC CHIP	0.22uF	10%	16V
C546	1-107-725-11	CERAMIC CHIP	0.1uF	10%	16V
C547	1-107-725-11	CERAMIC CHIP	0.1uF	10%	16V
C571	1-163-017-00	CERAMIC CHIP	0.0047uF	5%	50V
C572	1-126-964-11	ELECT	10uF	20%	50V
C573	1-126-964-11	ELECT	10uF	20%	50V
C660	1-163-239-11	CERAMIC CHIP	33PF	5%	50V(B)
C661	1-126-967-11	ELECT	47uF	20%	16V
C662	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C663	1-107-725-11	CERAMIC CHIP	0.1uF	10%	16V
C665	1-126-967-11	ELECT	47uF	20%	16V
C667	1-164-505-11	CERAMIC CHIP	2.2uF		16V
C668	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C669	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C670	1-164-505-11	CERAMIC CHIP	2.2uF		16V
C671	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
C672	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C673	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C674	1-126-967-11	ELECT	47uF	20%	16V
C675	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C676	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C677	1-126-960-11	ELECT	1uF	20%	50V
C678	1-126-961-11	ELECT	2.2uF	20%	50V
C679	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C680	1-163-139-00	CERAMIC CHIP	820PF	5%	50V
C681	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C682	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C701	1-126-964-11	ELECT	10uF	20%	50V
C704	1-126-964-11	ELECT	10uF	20%	50V
C705	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C708	1-126-967-11	ELECT	47uF	20%	16V
C709	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C710	1-126-969-11	ELECT	220uF	20%	50V (NP,VC1,VC2)
C710	1-126-965-11	ELECT	22uF	20%	50V(B)
C730	1-126-964-11	ELECT	10uF	20%	50V
C731	1-126-964-11	ELECT	10uF	20%	50V
C752	1-126-933-11	ELECT	100uF	20%	16V
C753	1-107-725-11	CERAMIC CHIP	0.1uF	10%	16V
C755	1-126-935-11	ELECT	470uF	20%	6.3V
C820	1-163-017-00	CERAMIC CHIP	0.0047uF	5%	50V
C821	1-163-017-00	CERAMIC CHIP	0.0047uF	5%	50V
C822	1-163-003-11	CERAMIC CHIP	330PF	10%	50V
C823	1-163-003-11	CERAMIC CHIP	330PF	10%	50V
C824	1-126-964-11	ELECT	10uF	20%	50V
C825	1-126-964-11	ELECT	10uF	20%	50V
C850	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C851	1-126-157-11	ELECT	10uF	20%	16V
C852	1-164-161-11	CERAMIC CHIP	0.0022uF	10%	100V
C853	1-163-989-11	CERAMIC CHIP	0.033uF	10%	25V
C855	1-164-489-11	CERAMIC CHIP	0.22uF	10%	16V
C856	1-163-038-91	CERAMIC CHIP	0.1uF		25V

Ref. No.	Part No.	Description	Remarks
		< CONNECTOR >	
CN101	1-779-724-11	CONNECTOR, BOARD TO BOARD 5P	
CN102	1-779-723-11	CONNECTOR, BOARD TO BOARD 9P	
CN104	1-766-716-11	CONNECTOR, BOARD TO BOARD 3P	
* CN161	1-564-004-11	PIN, CONNECTOR 5P	
CN164	1-784-514-11	CONNECTOR, FFC/FPC 35P	
CN165	1-506-469-11	PIN, CONNECTOR 4P	
CN305	1-573-847-11	CONNECTOR, BOARD TO BOARD 15P	
* CN306	1-766-718-21	CONNECTOR, BOARD TO BOARD 17P	
CN500	1-784-415-11	CONNECTOR, SQUARE TYPE 21P (LINE 1(TV))	
CN570	1-784-415-11	CONNECTOR, SQUARE TYPE 21P	(DECODER/LINE 3 IN)
CN600	1-569-341-11	CONNECTOR, BOARD TO BOARD 19P	
		< DIODE >	
D102	8-719-048-26	DIODE GL528V1	
D107	8-719-911-19	DIODE 1SS119	
D108	8-719-200-82	DIODE 11ES2	
D131	8-719-200-82	DIODE 11ES2	
D132	8-719-200-82	DIODE 11ES2	
D160	8-719-200-82	DIODE 11ES2	
D500	8-719-109-97	DIODE RD6.8ES-B2	
D501	8-719-109-97	DIODE RD6.8ES-B2	
D502	8-719-109-97	DIODE RD6.8ES-B2	
D503	8-719-109-97	DIODE RD6.8ES-B2	
D504	8-719-109-97	DIODE RD6.8ES-B2	
D505	8-719-109-97	DIODE RD6.8ES-B2	
D506	8-719-109-97	DIODE RD6.8ES-B2	
D507	8-719-109-97	DIODE RD6.8ES-B2	
D508	8-719-109-97	DIODE RD6.8ES-B2	
D510	8-719-109-97	DIODE RD6.8ES-B2	
D511	8-719-109-97	DIODE RD6.8ES-B2	
D512	8-719-921-86	DIODE MTZJ-13	
D513	8-719-109-97	DIODE RD6.8ES-B2	
D514	8-719-109-97	DIODE RD6.8ES-B2	
D515	8-719-109-97	DIODE RD6.8ES-B2	
D516	8-719-109-97	DIODE RD6.8ES-B2	
D517	8-719-108-12	DIODE RD9.1E-W	
D518	8-719-108-12	DIODE RD9.1E-W	
D519	8-719-108-12	DIODE RD9.1E-W	
D540	8-719-109-97	DIODE RD6.8ES-B2	
D541	8-719-109-97	DIODE RD6.8ES-B2	
D542	8-719-109-97	DIODE RD6.8ES-B2	
D543	8-719-109-97	DIODE RD6.8ES-B2	
D544	8-719-109-97	DIODE RD6.8ES-B2	
D570	8-719-109-97	DIODE RD6.8ES-B2	
D571	8-719-109-97	DIODE RD6.8ES-B2	
D572	8-719-109-97	DIODE RD6.8ES-B2	
D573	8-719-109-97	DIODE RD6.8ES-B2	
D574	8-719-109-97	DIODE RD6.8ES-B2	
D575	8-719-109-97	DIODE RD6.8ES-B2	
D576	8-719-109-97	DIODE RD6.8ES-B2	
D577	8-719-109-97	DIODE RD6.8ES-B2	
D578	8-719-109-97	DIODE RD6.8ES-B2	
D579	8-719-109-97	DIODE RD6.8ES-B2	
D580	8-719-109-97	DIODE RD6.8ES-B2	
D610	8-719-200-82	DIODE 11ES2	
D660	8-719-911-19	DIODE 1SS119	
D661	8-719-911-19	DIODE 1SS119	
D663	8-719-911-19	DIODE 1SS119	

Ref. No.	Part No.	Description	Remarks
D702	8-719-982-26	DIODE MTZJ-33B	
D750	8-719-200-82	DIODE 11ES2	
D800	8-719-911-19	DIODE 1SS119	
		< FILTER >	
FL500	1-236-163-11	ENCAPSULATED COMPONENT	
FL501	1-236-163-11	ENCAPSULATED COMPONENT	
FL502	1-236-163-11	ENCAPSULATED COMPONENT	
FL503	1-236-163-11	ENCAPSULATED COMPONENT	
FL504	1-236-163-11	ENCAPSULATED COMPONENT	
FL505	1-236-163-11	ENCAPSULATED COMPONENT	
FL570	1-236-163-11	ENCAPSULATED COMPONENT	
FL571	1-236-163-11	ENCAPSULATED COMPONENT	
FL572	1-236-163-11	ENCAPSULATED COMPONENT	
FL573	1-236-163-11	ENCAPSULATED COMPONENT	
		< IC >	
IC100	8-759-702-02	IC NJM062M	
IC141	8-759-100-93	IC uPC393G2	
IC160	8-752-891-51	IC CXP87948-009Q	
IC161	8-759-481-46	IC LB1943	
IC201	8-759-479-25	IC LA71514M-MPB	
IC202	8-759-439-50	IC LC89977M-TE-L	
IC360	8-759-486-63	IC TDA9615H/N1,518	
IC530	8-759-438-18	IC PQ12RD08	
IC540	8-759-438-16	IC STV6400D	
IC660	8-759-480-24	IC MB90089PF-G-VSX9373-BND-ER	
IC661	8-759-164-09	IC LA7218M-TE-R	
IC820	8-759-700-07	IC NJM2903M	
IC850	8-759-484-61	IC SDA5650X-GEG	
		< JACK >	
J500	1-784-414-11	JACK, PIN 2P (AUDIO OUT)	
		< JUMPER RESISTOR >	
JR001	1-216-296-91	SHORT 0	
JR002	1-216-295-91	SHORT 0	
JR003	1-216-295-91	SHORT 0	
JR004	1-216-295-91	SHORT 0	
JR005	1-216-296-91	SHORT 0	
JR006	1-216-296-91	SHORT 0	
JR007	1-216-296-91	SHORT 0	
JR008	1-216-296-91	SHORT 0	
JR009	1-216-295-91	SHORT 0	
JR010	1-216-295-91	SHORT 0	
JR011	1-216-295-91	SHORT 0	
JR012	1-216-295-91	SHORT 0	
JR013	1-216-296-91	SHORT 0	
JR014	1-216-295-91	SHORT 0	
JR015	1-216-296-91	SHORT 0	
JR016	1-216-295-91	SHORT 0	
JR017	1-216-296-91	SHORT 0	
JR018	1-216-296-91	SHORT 0	
JR019	1-216-296-91	SHORT 0	
JR020	1-216-296-91	SHORT 0	
JR021	1-216-295-91	SHORT 0	
JR022	1-216-295-91	SHORT 0	
JR023	1-216-296-91	SHORT 0	
JR024	1-216-296-91	SHORT 0	
JR025	1-216-295-91	SHORT 0	
JR026	1-216-295-91	SHORT 0	
JR027	1-216-296-91	SHORT 0	
JR028	1-216-296-91	SHORT 0	
JR029	1-216-296-91	SHORT 0	
JR030	1-216-295-91	SHORT 0	
JR031	1-216-295-91	SHORT 0	
JR032	1-216-295-91	SHORT 0	
JR033	1-216-296-91	SHORT 0	
JR034	1-216-295-91	SHORT 0	
JR035	1-216-296-91	SHORT 0	
JR036	1-216-295-91	SHORT 0	
JR037	1-216-295-91	SHORT 0	
JR038	1-216-295-91	SHORT 0	
JR039	1-216-296-91	SHORT 0	
JR040	1-216-296-91	SHORT 0	
JR041	1-216-295-91	SHORT 0	
JR042	1-216-296-91	SHORT 0	
JR043	1-216-296-91	SHORT 0	
JR044	1-216-296-91	SHORT 0	
JR045	1-216-295-91	SHORT 0	
JR046	1-216-296-91	SHORT 0	
JR047	1-216-295-91	SHORT 0	
JR048	1-216-296-91	SHORT 0	
JR049	1-216-296-91	SHORT 0	
JR050	1-216-296-91	SHORT 0	
JR051	1-216-295-91	SHORT 0	
JR052	1-216-296-91	SHORT 0	
JR053	1-216-296-91	SHORT 0	
JR054	1-216-296-91	SHORT 0	
JR055	1-216-295-91	SHORT 0	
JR056	1-216-295-91	SHORT 0	
JR057	1-216-295-91	SHORT 0	
JR058	1-216-295-91	SHORT 0	
		< JUMPER RESISTOR >	
JS201	1-216-295-91	SHORT 0	
JS390	1-216-296-91	SHORT 0	
JS391	1-216-296-91	SHORT 0	
		< COIL >	
L141	1-414-940-21	INDUCTOR 100uH	
L161	1-414-934-21	INDUCTOR 10uH	
L162	1-414-934-21	INDUCTOR 10uH	
L201	1-414-946-21	INDUCTOR 39uH	
L202	1-414-940-21	INDUCTOR 100uH	
L203	1-469-014-21	INDUCTOR 120uH	
L204	1-414-934-21	INDUCTOR 10uH	
L205	1-408-982-11	INDUCTOR 100uH	
L206	1-414-934-21	INDUCTOR 10uH	
L207	1-414-934-21	INDUCTOR 10uH	
L301	1-414-940-21	INDUCTOR 100uH	
L361	1-414-940-21	INDUCTOR 100uH	
L510	1-414-940-21	INDUCTOR 100uH	
L530	1-414-940-21	INDUCTOR 100uH	
L540	1-414-934-21	INDUCTOR 10uH	
L660	1-414-186-31	INDUCTOR 33uH	
L662	1-414-940-21	INDUCTOR 100uH	
L663	1-414-940-21	INDUCTOR 100uH	
L664	1-412-470-21	INDUCTOR 22uH	
L701	1-414-930-21	INDUCTOR 2.2uH	

Ref. No.	Part No.	Description			Remarks
L750	1-414-930-21	INDUCTOR	2.2uH		
L755	1-414-940-21	INDUCTOR	100uH		
		< PHOTO INTERRUPTER >			
PH100	8-749-013-23	PHOTO INTERRUPTER GP3S120			
PH101	8-749-013-23	PHOTO INTERRUPTER GP3S120			
		< IC LINK >			
⚠PS130	1-533-586-31	LINK, IC 315mA			
⚠PS131	1-533-586-31	LINK, IC 315mA			
⚠PS331	1-533-586-31	LINK, IC 315mA			
⚠PS533	1-533-586-31	LINK, IC 315mA			
		< TRANSISTOR >			
Q100	8-729-043-84	TRANSISTOR	PT380F3		
Q101	8-729-043-84	TRANSISTOR	PT380F3		
Q102	8-729-281-53	TRANSISTOR	2SC1815-GR		
Q141	8-729-424-08	TRANSISTOR	UN2111		
Q201	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q202	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q208	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q209	8-729-216-22	TRANSISTOR	2SA1162		
Q210	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q211	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q301	8-729-281-53	TRANSISTOR	2SC1815-GR		
Q501	8-729-424-08	TRANSISTOR	UN2111		
Q502	8-729-421-19	TRANSISTOR	UN2213		
Q510	8-729-216-22	TRANSISTOR	2SA1162		
Q533	8-729-804-41	TRANSISTOR	2SB1122-S		
Q534	8-729-421-19	TRANSISTOR	UN2213		
Q540	8-729-216-22	TRANSISTOR	2SA1162		
Q611	8-729-804-41	TRANSISTOR	2SB1122-S		
Q612	8-729-421-19	TRANSISTOR	UN2213		
Q613	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q660	8-729-421-19	TRANSISTOR	UN2213 (B)		
Q661	8-729-422-27	TRANSISTOR	2SD601A-Q (B)		
Q662	8-729-216-22	TRANSISTOR	2SA1162		
Q663	8-729-216-22	TRANSISTOR	2SA1162		
Q664	8-729-216-22	TRANSISTOR	2SA1162		
Q703	8-729-421-19	TRANSISTOR	UN2213		
Q751	8-729-421-19	TRANSISTOR	UN2213		
Q752	8-729-216-22	TRANSISTOR	2SA1162		
Q800	8-729-216-22	TRANSISTOR	2SA1162		
Q801	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q802	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q803	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q804	8-729-421-19	TRANSISTOR	UN2213		
Q820	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q821	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q850	8-729-216-22	TRANSISTOR	2SA1162		
		< RESISTOR >			
R100	1-249-400-11	CARBON	39	5%	1/4W F
R101	1-249-400-11	CARBON	39	5%	1/4W F
R102	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R103	1-216-085-00	METAL CHIP	33K	5%	1/10W
R104	1-216-085-00	METAL CHIP	33K	5%	1/10W
R105	1-249-413-11	CARBON	470	5%	1/4W F
R106	1-216-089-91	RES,CHIP	47K	5%	1/10W
R107	1-216-089-91	RES,CHIP	47K	5%	1/10W
R109	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R110	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R111	1-216-103-00	METAL CHIP	180K	5%	1/10W
R112	1-216-689-11	METAL CHIP	39K	0.5%	1/10W
R113	1-208-806-11	RES,CHIP	10K	0.50%	1/10W
R114	1-208-806-11	RES,CHIP	10K	0.50%	1/10W
R115	1-216-089-91	RES,CHIP	47K	5%	1/10W
R116	1-216-089-91	RES,CHIP	47K	5%	1/10W
R117	1-216-089-91	RES,CHIP	47K	5%	1/10W
R118	1-216-089-91	RES,CHIP	47K	5%	1/10W
R130	1-216-085-00	METAL CHIP	33K	5%	1/10W
R131	1-216-085-00	METAL CHIP	33K	5%	1/10W
R132	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R133	1-216-073-00	METAL CHIP	10K	5%	1/10W
R134	1-216-089-91	RES,CHIP	47K	5%	1/10W
R145	1-216-105-91	RES,CHIP	220K	5%	1/10W
R147	1-208-830-11	RES,CHIP	100K	0.50%	1/10W
R148	1-208-830-11	RES,CHIP	100K	0.50%	1/10W
R149	1-208-830-11	RES,CHIP	100K	0.50%	1/10W
R151	1-208-830-11	RES,CHIP	100K	0.50%	1/10W
R152	1-216-111-00	METAL CHIP	390K	5%	1/10W
R153	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R155	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R160	1-216-073-00	METAL CHIP	10K	5%	1/10W
R161	1-216-073-00	METAL CHIP	10K	5%	1/10W
R162	1-216-089-91	RES,CHIP	47K	5%	1/10W
R163	1-249-429-11	CARBON	10K	5%	1/4W
R164	1-249-437-11	CARBON	47K	5%	1/4W
R165	1-216-041-00	METAL CHIP	470	5%	1/10W
R166	1-216-041-00	METAL CHIP	470	5%	1/10W
R167	1-249-417-11	CARBON	1K	5%	1/4W F
R168	1-247-807-31	CARBON	100	5%	1/4W
R169	1-247-807-31	CARBON	100	5%	1/4W
R170	1-247-807-31	CARBON	100	5%	1/4W
R171	1-247-807-31	CARBON	100	5%	1/4W
R172	1-249-429-11	CARBON	10K	5%	1/4W
R173	1-249-429-11	CARBON	10K	5%	1/4W
R174	1-216-041-00	METAL CHIP	470	5%	1/10W
R175	1-216-049-91	RES,CHIP	1K	5%	1/10W
R176	1-249-429-11	CARBON	10K	5%	1/4W
R177	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R178	1-216-295-91	SHORT	0		
R179	1-249-429-11	CARBON	10K	5%	1/4W
R180	1-216-089-91	RES,CHIP	47K	5%	1/10W
R181	1-216-097-91	RES,CHIP	100K	5%	1/10W
R183	1-249-413-11	CARBON	470	5%	1/4W F
R184	1-249-413-11	CARBON	470	5%	1/4W F
R201	1-216-041-00	METAL CHIP	470	5%	1/10W
R202	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R203	1-249-413-11	CARBON	470	5%	1/4W F
R204	1-216-047-91	RES,CHIP	820	5%	1/10W
R205	1-216-037-00	METAL CHIP	330	5%	1/10W

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description			Remarks
R206	1-216-037-00	METAL CHIP	330	5%	1/10W
R207	1-216-073-00	METAL CHIP	10K	5%	1/10W
R208	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R209	1-216-041-00	METAL CHIP	470	5%	1/10W
R210	1-216-025-91	RES,CHIP	100	5%	1/10W
R218	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R219	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R221	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R222	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R223	1-216-017-91	RES,CHIP	47	5%	1/10W
R224	1-216-017-91	RES,CHIP	47	5%	1/10W
R225	1-216-017-91	RES,CHIP	47	5%	1/10W
R226	1-216-025-91	RES,CHIP	100	5%	1/10W
R227	1-216-025-91	RES,CHIP	100	5%	1/10W
R228	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R229	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R230	1-216-045-00	METAL CHIP	680	5%	1/10W
R231	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R232	1-216-049-91	RES,CHIP	1K	5%	1/10W
R233	1-216-055-00	METAL CHIP	1.8K	5%	1/10W
R234	1-216-089-91	RES,CHIP	47K	5%	1/10W
R235	1-216-049-91	RES,CHIP	1K	5%	1/10W
R236	1-216-049-91	RES,CHIP	1K	5%	1/10W
R239	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R240	1-216-049-91	RES,CHIP	1K	5%	1/10W
R243	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R248	1-216-295-91	SHORT	0		
R301	1-249-439-11	CARBON	68K	5%	1/4W
R302	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R306	1-216-073-00	METAL CHIP	10K	5%	1/10W
R307	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R309	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R310	1-216-129-00	METAL CHIP	2.2M	5%	1/10W
R311	1-216-051-00	METAL CHIP	1.2K	5%	1/10W
R312	1-216-079-00	METAL CHIP	18K	5%	1/10W
R313	1-216-109-00	METAL CHIP	330K	5%	1/10W
R314	1-216-035-00	METAL CHIP	270	5%	1/10W
R315	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R316	1-216-073-00	METAL CHIP	10K	5%	1/10W
R318	1-216-075-00	METAL CHIP	12K	5%	1/10W
R320	1-216-047-91	RES,CHIP	820	5%	1/10W
R360	1-216-081-00	METAL CHIP	22K	5%	1/10W
R361	1-216-081-00	METAL CHIP	22K	5%	1/10W
R368	1-216-133-00	METAL CHIP	3.3M	5%	1/10W
R370	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R371	1-208-820-11	RES,CHIP	39K	0.50%	1/10W
R372	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R378	1-216-083-00	METAL CHIP	27K	5%	1/10W
R380	1-216-295-91	SHORT	0		
R381	1-216-295-91	SHORT	0		
R382	1-216-079-00	METAL CHIP	18K	5%	1/10W
R383	1-216-079-00	METAL CHIP	18K	5%	1/10W
R384	1-216-091-00	METAL CHIP	56K	5%	1/10W
R385	1-216-091-00	METAL CHIP	56K	5%	1/10W
R389	1-216-073-00	METAL CHIP	10K	5%	1/10W
R390	1-216-079-00	METAL CHIP	18K	5%	1/10W
R391	1-216-079-00	METAL CHIP	18K	5%	1/10W
R392	1-216-079-00	METAL CHIP	18K	5%	1/10W
R393	1-216-079-00	METAL CHIP	18K	5%	1/10W
R394	1-216-049-91	RES,CHIP	1K	5%	1/10W

Ref. No.	Part No.	Description			Remarks
R399	1-216-049-91	RES,CHIP	1K	5%	1/10W
R500	1-216-041-00	METAL CHIP	470	5%	1/10W
R501	1-216-041-00	METAL CHIP	470	5%	1/10W
R502	1-216-025-91	RES,CHIP	100	5%	1/10W
R503	1-216-025-91	RES,CHIP	100	5%	1/10W
R504	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R505	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R510	1-249-408-11	CARBON	180	5%	1/4W F
R511	1-249-407-11	CARBON	150	5%	1/4W F
R512	1-216-021-00	METAL CHIP	68	5%	1/10W
R514	1-216-037-00	METAL CHIP	330	5%	1/10W
R515	1-216-049-91	RES,CHIP	1K	5%	1/10W
R516	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R517	1-216-022-00	METAL CHIP	75	5%	1/10W
R533	1-216-049-91	RES,CHIP	1K	5%	1/10W
R534	1-216-049-91	RES,CHIP	1K	5%	1/10W
R540	1-216-025-91	RES,CHIP	100	5%	1/10W
R541	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R542	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R545	1-216-085-00	METAL CHIP	33K	5%	1/10W
R546	1-216-089-91	RES,CHIP	47K	5%	1/10W
R547	1-216-049-91	RES,CHIP	1K	5%	1/10W
R548	1-216-022-00	METAL CHIP	75	5%	1/10W
R549	1-247-804-11	CARBON	75	5%	1/4W
R570	1-249-413-11	CARBON	470	5%	1/4W F
R571	1-249-413-11	CARBON	470	5%	1/4W F
R572	1-216-025-91	RES,CHIP	100	5%	1/10W
R573	1-216-025-91	RES,CHIP	100	5%	1/10W
R574	1-216-097-91	RES,CHIP	100K	5%	1/10W
R575	1-216-097-91	RES,CHIP	100K	5%	1/10W
R620	1-216-049-91	RES,CHIP	1K	5%	1/10W
R621	1-216-049-91	RES,CHIP	1K	5%	1/10W
R622	1-216-073-00	METAL CHIP	10K	5%	1/10W
R623	1-249-429-11	CARBON	10K	5%	1/4W
R624	1-216-079-00	METAL CHIP	18K	5%	1/10W
R660	1-216-073-00	METAL CHIP	10K	5%	110W (B)
R661	1-216-073-00	METAL CHIP	10K	5%	1/10W (B)
R662	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R663	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R664	1-216-081-00	METAL CHIP	22K	5%	1/10W
R665	1-216-041-00	METAL CHIP	470	5%	1/10W
R666	1-216-041-00	METAL CHIP	470	5%	1/10W
R667	1-216-081-00	METAL CHIP	22K	5%	1/10W
R668	1-216-073-00	METAL CHIP	10K	5%	1/10W
R669	1-216-033-00	METAL CHIP	220	5%	1/10W
R670	1-216-041-00	METAL CHIP	470	5%	1/10W
R671	1-249-407-11	CARBON	150	5%	1/4W F
R672	1-216-073-00	METAL CHIP	10K	5%	1/10W
R673	1-216-073-00	METAL CHIP	10K	5%	1/10W
R674	1-216-073-00	METAL CHIP	10K	5%	1/10W
R675	1-216-063-91	RES,CHIP	3.9K	5%	1/10W
R676	1-216-043-91	RES,CHIP	560	5%	1/10W
R677	1-216-101-00	METAL CHIP	150K	5%	1/10W
R678	1-216-049-91	RES,CHIP	1K	5%	1/10W
R702	1-216-295-91	SHORT	0		
R709	1-216-081-00	METAL CHIP	22K	5%	1/10W (NP,VC1,VC2)
R709	1-216-105-91	RES,CHIP	220K	5%	1/10W (B)
R711	1-212-893-00	FUSIBLE	330	5%	1/4W F

Ref. No.	Part No.	Description			Remarks
R713	1-216-025-91	RES,CHIP	100	5%	1/10W
R714	1-216-113-00	METAL CHIP	470K	5%	1/10W
R715	1-216-049-91	RES,CHIP	1K	5%	1/10W
R716	1-216-049-91	RES,CHIP	1K	5%	1/10W
R717	1-216-037-00	METAL CHIP	330	5%	1/10W
R730	1-216-041-00	METAL CHIP	470	5%	1/10W
R731	1-216-041-00	METAL CHIP	470	5%	1/10W (B)
R732	1-216-041-00	METAL CHIP	470	5%	1/10W
R733	1-216-041-00	METAL CHIP	470	5%	1/10W (B)
R754	1-216-025-91	RES,CHIP	100	5%	1/10W
R755	1-216-025-91	RES,CHIP	100	5%	1/10W
R756	1-216-073-00	METAL CHIP	10K	5%	1/10W
R757	1-216-049-91	RES,CHIP	1K	5%	1/10W
R800	1-216-101-00	METAL CHIP	150K	5%	1/10W
R801	1-216-073-00	METAL CHIP	10K	5%	1/10W
R802	1-216-073-00	METAL CHIP	10K	5%	1/10W
R803	1-216-081-00	METAL CHIP	22K	5%	1/10W
R804	1-216-073-00	METAL CHIP	10K	5%	1/10W
R805	1-216-073-00	METAL CHIP	10K	5%	1/10W
R806	1-216-073-00	METAL CHIP	10K	5%	1/10W
R807	1-216-085-00	METAL CHIP	33K	5%	1/10W
R813	1-216-073-00	METAL CHIP	10K	5%	1/10W
R820	1-216-073-00	METAL CHIP	10K	5%	1/10W
R821	1-216-073-00	METAL CHIP	10K	5%	1/10W
R823	1-216-081-00	METAL CHIP	22K	5%	1/10W
R825	1-216-081-00	METAL CHIP	22K	5%	1/10W
R826	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R827	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R828	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R829	1-216-081-00	METAL CHIP	22K	5%	1/10W
R830	1-216-081-00	METAL CHIP	22K	5%	1/10W
R831	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R832	1-216-037-00	METAL CHIP	330	5%	1/10W
R833	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R834	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R850	1-247-807-31	CARBON	100	5%	1/4W
R851	1-216-079-00	METAL CHIP	18K	5%	1/10W
R852	1-216-083-00	METAL CHIP	27K	5%	1/10W
R853	1-216-049-91	RES,CHIP	1K	5%	1/10W
R856	1-216-097-91	RES,CHIP	100K	5%	1/10W
R857	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R858	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R859	1-216-123-11	METAL CHIP	1.2M	5%	1/10W
R860	1-216-123-11	METAL CHIP	1.2M	5%	1/10W
R861	1-216-117-00	METAL CHIP	680K	5%	1/10W
R862	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
		< MODULATOR >			
RFU750	1-475-058-11	MODULATOR, RF (RFU-2110) (B)			
RFU750	1-475-059-11	MODULATOR, RF (RFU-2101) (NP,VC1,VC2)			
		< SWITCH >			
S100	1-771-155-11	SWITCH, ROTARY (ROTARY ENCODER)			
S101	1-762-108-11	SWITCH, PUSH (1 KEY) (CASSETTE IN/REC PROOF)			
S160	1-571-588-31	SWITCH, SLIDE (NTSC PB)			

Ref. No.	Part No.	Description			Remarks
		< TUNER >			
TU701	8-598-402-00	FSS TUNER BTF-WC411 (NP)			
TU702	1-693-362-11	TUNER, (IF) SOLID TYPE (B)			
TU702	1-693-368-11	TUNER, (IF) SOLID TYPE (VC1,VC2)			
		< VIBRATOR >			
X160	1-760-494-11	VIBRATOR, CRYSTAL 16MHz			
X201	1-579-608-11	VIBRATOR, CRYSTAL 4.433619MHz			
X660	1-577-289-11	VIBRATOR, CRYSTAL 17.734475MHz			
X661	1-577-165-11	VIBRATOR, CERAMIC			
*	A-6791-531-A	RP-231 BOARD, COMPLETE			
		********** (Ref.No.:1,000 series)			
		< CAPACITOR >			
C141	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C142	1-126-960-11	ELECT	1uF	20%	50V
C143	1-126-967-11	ELECT	47uF	20%	16V
C144	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C145	1-163-018-00	CERAMIC CHIP	0.0056uF	5%	50V
C146	1-126-933-11	ELECT	100uF	20%	16V
C147	1-126-960-11	ELECT	1uF	20%	50V
C260	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C261	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C264	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C265	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C266	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C267	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C268	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C269	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C270	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C271	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C272	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C273	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C274	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C275	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C276	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C277	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C278	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C279	1-163-037-11	CERAMIC CHIP	0.022uF	10%	25V
C280	1-124-584-00	ELECT	100uF	20%	10V
C282	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C283	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C284	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C285	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C286	1-128-057-11	ELECT	330uF	20%	6.3V
C287	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C288	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C289	1-163-038-91	CERAMIC CHIP	0.1uF		25V
C298	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C321	1-126-967-11	ELECT	47uF	20%	16V
C322	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C323	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C324	1-137-462-11	FILM	0.018uF	5%	100V
C331	1-126-933-11	ELECT	100uF	20%	16V
C332	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C334	1-163-011-11	CERAMIC CHIP	0.0015uF	10%	50V
C335	1-137-397-11	FILM	0.047uF	5%	100V
C340	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C341	1-124-584-00	ELECT	100uF	20%	10V

Ref. No.	Part No.	Description			Remarks
C342	1-164-004-11	CERAMIC CHIP	0.1uF	10% 25V	
C346	1-164-232-11	CERAMIC CHIP	0.01uF	50V	
C350	1-164-004-11	CERAMIC CHIP	0.1uF	10% 25V	
C352	1-163-009-11	CERAMIC CHIP	0.001uF	10% 50V	
C353	1-163-038-91	CERAMIC CHIP	0.1uF	25V	
C357	1-163-009-11	CERAMIC CHIP	0.001uF	10% 50V	
C358	1-163-038-91	CERAMIC CHIP	0.1uF	25V	
C359	1-163-031-11	CERAMIC CHIP	0.01uF	50V	
		< CONNECTOR >			
CN260	1-784-492-11	CONNECTOR, FFC/FPC 13P			
* CN261	1-564-030-00	PIN, CONNECTOR 5P			
CN271	1-573-829-11	CONNECTOR, BOARD TO BOARD 15P			
CN272	1-766-720-11	CONNECTOR, BOARD TO BOARD 17P			
CN301	1-506-481-11	PIN, CONNECTOR 2P			
* CN302	1-568-944-11	PIN, CONNECTOR 6P			
* CN341	1-564-027-00	PIN, CONNECTOR 2P			
		< IC >			
IC140	8-759-438-83	IC BA6305F-E2			
IC260	8-759-352-17	IC HA118195NT			
IC301	8-759-089-84	IC BA7755AF-T1			
IC340	8-759-486-92	IC LA7256			
		< JUMPER RESISTOR >			
JR260	1-216-295-91	SHORT 0			
		< JUMPER RESISTOR >			
JS350	1-216-295-91	SHORT 0			
		< COIL >			
L140	1-414-940-21	INDUCTOR	100uH		
L262	1-414-940-21	INDUCTOR	100uH		
L263	1-414-940-21	INDUCTOR	100uH		
L321	1-414-940-21	INDUCTOR	100uH		
L322	1-414-940-21	INDUCTOR	100uH		
L331	1-410-687-11	INDUCTOR	1.2mH		
L341	1-414-940-21	INDUCTOR	100uH		
		< IC LINK >			
PS331	1-533-586-31	LINK, IC 315mA			
		< TRANSISTOR >			
Q260	8-729-422-27	TRANSISTOR 2SD601A-Q			
Q321	8-729-802-91	TRANSISTOR 2SD879			
Q331	8-729-012-31	TRANSISTOR 2SC4040-TL2-Q			
Q332	8-729-900-51	TRANSISTOR DTA114TK			
		< RESISTOR >			
R140	1-216-117-00	METAL CHIP	680K	5% 1/10W	
R141	1-216-037-00	METAL CHIP	330	5% 1/10W	
R142	1-216-049-91	RES,CHIP	1K	5% 1/10W	
R143	1-216-065-91	RES,CHIP	4.7K	5% 1/10W	
R144	1-216-043-91	RES,CHIP	560	5% 1/10W	
R150	1-216-065-91	RES,CHIP	4.7K	5% 1/10W	
R260	1-216-043-91	RES,CHIP	560	5% 1/10W	
R261	1-216-043-91	RES,CHIP	560	5% 1/10W	
R262	1-216-295-91	SHORT 0			
R263	1-216-295-91	SHORT 0			

Ref. No.	Part No.	Description			Remarks
R264	1-216-295-91	SHORT 0			
R265	1-216-295-91	SHORT 0			
R266	1-216-053-00	METAL CHIP	1.5K	5% 1/10W	
R267	1-216-071-00	METAL CHIP	8.2K	5% 1/10W	
R268	1-216-081-00	METAL CHIP	22K	5% 1/10W	
R269	1-216-059-00	METAL CHIP	2.7K	5% 1/10W	
R270	1-216-081-00	METAL CHIP	22K	5% 1/10W	
R271	1-216-049-91	RES,CHIP	1K	5% 1/10W	
R272	1-216-081-00	METAL CHIP	22K	5% 1/10W	
R273	1-216-081-00	METAL CHIP	22K	5% 1/10W	
R274	1-216-073-00	METAL CHIP	10K	5% 1/10W	
R275	1-216-073-00	METAL CHIP	10K	5% 1/10W	
R276	1-216-049-91	RES,CHIP	1K	5% 1/10W	
R317	1-216-079-00	METAL CHIP	18K	5% 1/10W	
R321	1-216-017-91	RES,CHIP	47	5% 1/10W	
R322	1-216-067-00	METAL CHIP	5.6K	5% 1/10W	
R323	1-249-381-11	CARBON	1	5% 1/4W F	
R324	1-249-408-11	CARBON	180	5% 1/4W F	
R332	1-216-083-00	METAL CHIP	27K	5% 1/10W	
R333	1-249-394-11	CARBON	12	5% 1/4W F	
R335	1-216-073-00	METAL CHIP	10K	5% 1/10W	
R336	1-216-164-00	RES,CHIP	39	5% 1/8W	
R337	1-216-164-00	RES,CHIP	39	5% 1/8W	
R344	1-216-053-00	METAL CHIP	1.5K	5% 1/10W	
R346	1-216-065-91	RES,CHIP	4.7K	5% 1/10W	
R347	1-216-065-91	RES,CHIP	4.7K	5% 1/10W	
R348	1-216-033-00	METAL CHIP	220	5% 1/10W	
		< TRANSFORMER >			
T321	1-431-100-11	TRANSFORMER, BIAS OSCILLATION			
T331	1-423-415-11	TRANSFORMER, BIAS OSCILLATION			

*	A-6791-537-A	SE-69 BOARD, COMPLETE (B)	
		**********	
			(Ref.No.:2,000 series)
		< CAPACITOR >	
C970	1-163-259-91	CERAMIC CHIP	220PF 5% 50V
C971	1-124-257-00	ELECT	2.2uF 20% 50V
C972	1-163-017-00	CERAMIC CHIP	0.0047uF 5% 50V
C973	1-164-232-11	CERAMIC CHIP	0.01uF 50V
C974	1-109-982-11	CERAMIC CHIP	1uF 10% 10V
C975	1-163-037-11	CERAMIC CHIP	0.022uF 10% 25V
C976	1-163-259-91	CERAMIC CHIP	220PF 5% 50V
C977	1-164-232-11	CERAMIC CHIP	0.01uF 50V
C978	1-163-017-00	CERAMIC CHIP	0.0047uF 5% 50V
C979	1-163-121-00	CERAMIC CHIP	150PF 5% 50V
C980	1-107-725-11	CERAMIC CHIP	0.1uF 10% 16V
C981	1-164-232-11	CERAMIC CHIP	0.01uF 50V
C982	1-163-007-11	CERAMIC CHIP	680PF 10% 50V
C983	1-163-009-11	CERAMIC CHIP	0.001uF 10% 50V
C984	1-164-232-11	CERAMIC CHIP	0.01uF 50V
C985	1-163-251-11	CERAMIC CHIP	100PF 5% 50V
C986	1-126-157-11	ELECT	10uF 20% 16V
C987	1-107-823-11	CERAMIC CHIP	0.47uF 10% 16V
C988	1-163-251-11	CERAMIC CHIP	100PF 5% 50V
C991	1-107-725-11	CERAMIC CHIP	0.1uF 10% 16V

Ref. No.	Part No.	Description			Remarks
C992	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C993	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C994	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C995	1-126-157-11	ELECT	10uF	20%	16V
C996	1-163-227-11	CERAMIC CHIP	10PF	0.5PF	50V
		< CONNECTOR >			
CN970	1-573-825-11	CONNECTOR, BOARD TO BOARD 11P			
		< IC >			
IC970	8-759-438-17	IC LA7337			
		< JUMPER RESISTOR >			
JR970	1-216-296-91	SHORT	0		
JR971	1-216-296-91	SHORT	0		
JR972	1-216-296-91	SHORT	0		
JR973	1-216-295-91	SHORT	0		
JR974	1-216-295-91	SHORT	0		
		< COIL >			
L970	1-414-933-11	INDUCTOR	6.8uH		
L971	1-414-945-11	INDUCTOR	27uH		
L972	1-414-938-21	INDUCTOR	47uH		
L973	1-414-938-21	INDUCTOR	47uH		
L975	1-414-934-21	INDUCTOR	10uH		
		< TRANSISTOR >			
Q970	8-729-216-22	TRANSISTOR	2SA1162		
Q972	8-729-424-08	TRANSISTOR	UN2111		
Q973	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q974	8-729-422-27	TRANSISTOR	2SD601A-Q		
Q975	8-729-424-08	TRANSISTOR	UN2111		
Q976	8-729-421-19	TRANSISTOR	UN2213		
		< RESISTOR >			
R969	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R970	1-216-085-00	METAL CHIP	33K	5%	1/10W
R971	1-216-085-00	METAL CHIP	33K	5%	1/10W
R972	1-216-093-00	METAL CHIP	68K	5%	1/10W
R973	1-216-689-11	METAL CHIP	39K	0.5%	1/10W
R974	1-216-081-00	METAL CHIP	22K	5%	1/10W
R975	1-216-295-91	SHORT	0		
R976	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R977	1-216-089-91	RES,CHIP	47K	5%	1/10W
R978	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R979	1-216-073-00	METAL CHIP	10K	5%	1/10W
R980	1-216-097-91	RES,CHIP	100K	5%	1/10W
R981	1-216-083-00	METAL CHIP	27K	5%	1/10W
R982	1-216-089-91	RES,CHIP	47K	5%	1/10W
R983	1-216-065-91	RES,CHIP	4.7K	5%	1/10W
R985	1-216-041-00	METAL CHIP	470	5%	1/10W
R986	1-216-089-91	RES,CHIP	47K	5%	1/10W
R988	1-216-083-00	METAL CHIP	27K	5%	1/10W
R989	1-216-049-91	RES,CHIP	1K	5%	1/10W
R990	1-216-295-91	SHORT	0		
R993	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R994	1-216-689-11	METAL CHIP	39K	0.5%	1/10W
R995	1-216-073-00	METAL CHIP	10K	5%	1/10W
R996	1-216-689-11	METAL CHIP	39K	0.5%	1/10W
R997	1-216-073-00	METAL CHIP	10K	5%	1/10W
R998	1-216-073-00	METAL CHIP	10K	5%	1/10W
R999	1-216-295-91	SHORT	0		

Ref. No.	Part No.	Description			Remarks
⚠	1-468-273-11	POWER BLOCK SR826			
		**********			
					(Ref.No.: 9,000 Series)
		< CAPACITOR >			
C151	9-980-236-01	ELECT	47uF	400V	
C153	1-126-967-11	ELECT	47uF	50V	
C154	1-126-960-11	ELECT	1uF	50V	
C201	1-126-934-11	ELECT	220uF	16V	
C202	1-126-925-11	ELECT	470uF	10V	
C203	1-126-934-11	ELECT	220uF	16V	
C204	1-126-933-11	ELECT	100uF	16V	
C205	1-126-965-11	ELECT	22uF	50V	
C206	1-126-947-11	ELECT	47uF	35V	
C207	1-126-965-11	ELECT	22uF	50V	
C208	1-126-925-11	ELECT	470uF	10V	
C251	1-126-967-11	ELECT	47uF	50V	
C252	1-126-183-11	ELECT	1000uF	16V	
C253	1-126-927-11	ELECT	2200uF	10V	
C254	1-126-967-11	ELECT	47uF	50V	
C255	1-126-925-11	ELECT	470uF	10V	
		< DIODE >			
D151	8-719-043-74	DIODE	AK04		
D153	8-719-911-19	DIODE	1SS119		
D154	8-719-043-74	DIODE	AK04		
D155	9-900-535-01	DIODE	AU02Z		
D203	8-719-109-85	DIODE	RD5.1ES		
D204	8-719-911-19	DIODE	1SS119		
D205	8-719-911-19	DIODE	1SS119		
D251	9-900-535-01	DIODE	AU02Z		
D252	8-719-510-73	DIODE	S3L20U		
D253	8-719-027-20	DIODE	D3S4M		
D254	9-900-535-01	DIODE	AU02Z		
D255	9-900-535-01	DIODE	AU02Z		
		< FUSE >			
⚠F101	1-532-388-31	FUSE	T2A, 250V		
		< IC >			
IC151	9-980-235-01	IC	AN8028		
IC201	8-759-438-18	IC	PQ12RD08		
		< PHOTOCOUPLER >			
⚠PC151	8-749-924-80	PHOTOCOUPLER	PS2561		
		< IC LINK >			
⚠PS201	1-533-592-21	LINK, IC	1.6A		
⚠PS202	1-533-593-21	LINK, IC	2A		
⚠PS251	1-533-588-11	FUSE	0.5A		

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

POWER BLOCK

Ref. No.	Part No.	Description			Remarks
		< TRANSISTOR >			
Q201	8-729-113-32	TRANSISTOR	2SB733		
Q205	8-729-019-01	TRANSISTOR	2SD2394		
Q206	8-729-119-78	TRANSISTOR	2SC2785		
Q208	8-729-177-32	TRANSISTOR	2SD773		
Q211	8-729-422-72	TRANSISTOR	UN4211		
		< RESISTOR >			
R253	9-980-233-01	FUSIBLE	0.47	1/4W	
		MISCELLANEOUS			
		**********			
⚠9	1-782-012-11	CORD, POWER			
11	1-762-844-31	SWITCH, ROTARY			
12	1-783-169-11	CABLE, FLAT (FFD-2)			
14	1-783-167-11	CABLE, FLAT (FFM-18)			
⚠54	1-468-273-11	POWER BLOCK			
56	1-779-725-11	CONNECTOR, BOARD TO BOARD 5P			
721	A-6759-620-A	HEAD BLOCK ASSY, ACE (TDK)			
769	1-759-373-11	DRUM ASSY DZH-86A-R (M901)(NP,VC1,VC2)			
769	1-759-557-11	DRUM ASSY DZH-98A-R (M901)(B)			
M902	1-698-971-11	MOTOR, DC (CAPSTAN)			
M903	X-3947-577-1	MOTOR ASSY,CAM			

Ref. No.	Part No.	Description	Remarks
		ACCESSORIES & PACKING MATERIALS	
		**********	
	1-696-593-11	CORD, CONNECTION (PAL) (FOR RF) 1.5m	
	1-696-861-11	CORD, CONNECTION (FOR AUDIO) 1.5m	
	1-782-213-11	CABLE, CONNECTION (21P) (FOR EURO-AV) 1.5m	
	3-862-065-11	MANUAL, INSTRUCTION (GERMAN) (NP,VC1,VC2)	
	3-862-065-21	MANUAL, INSTRUCTION (FRENCH) (NP,VC2)	
	3-862-065-31	MANUAL, INSTRUCTION (ITALIAN) (VC2)	
	3-862-065-41	MANUAL, INSTRUCTION (DUTCH) (NP,VC2)	
	3-862-065-51	MANUAL, INSTRUCTION (SPANISH) (NP)	
	3-862-065-61	MANUAL, INSTRUCTION (PORTUGUESE) (NP)	
	3-862-065-71	MANUAL, INSTRUCTION (SWEDISH) (NP)	
	3-862-065-81	MANUAL, INSTRUCTION (DANISH) (NP)	
	3-862-065-91	MANUAL, INSTRUCTION (FINNISH) (NP)	
	3-862-066-11	MANUAL, INSTRUCTION (FRENCH) (B)	
	3-862-067-11	MANUAL, INSTRUCTION (GERMAN) (NP,VC1,VC2)	
	3-862-067-21	MANUAL, INSTRUCTION (FRENCH) (NP,VC2)	
	3-862-067-31	MANUAL, INSTRUCTION (ITALIAN) (VC2)	
	3-862-067-41	MANUAL, INSTRUCTION (DUTCH) (NP,VC2)	
	3-862-067-51	MANUAL, INSTRUCTION (SPANISH) (NP)	
	3-862-067-61	MANUAL, INSTRUCTION (PORTUGUESE) (NP)	
	3-862-067-71	MANUAL, INSTRUCTION (SWEDISH) (NP)	
	3-862-067-81	MANUAL, INSTRUCTION (DANISH) (NP)	
	3-862-067-91	MANUAL, INSTRUCTION (FINNISH) (NP)	
	3-862-068-11	MANUAL, INSTRUCTION (FRENCH) (B)	
*	3-988-123-01	INDIVIDUAL CARTON (NP,VC1,VC2)	
*	3-988-123-11	INDIVIDUAL CARTON (B)	
		**********	
		HARDWARE LIST	
		**********	
#1	7-685-648-79	SCREW +BVTP 3X12 TYPE2	
#2	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3	
#701	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3	
#702	7-682-547-04	SCREW +P 3X6	
#703	7-685-133-19	SCREW (DIA)(IT3B)	

Note : The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

9-921-673-11

Sony Corporation
Home A&V Products Company

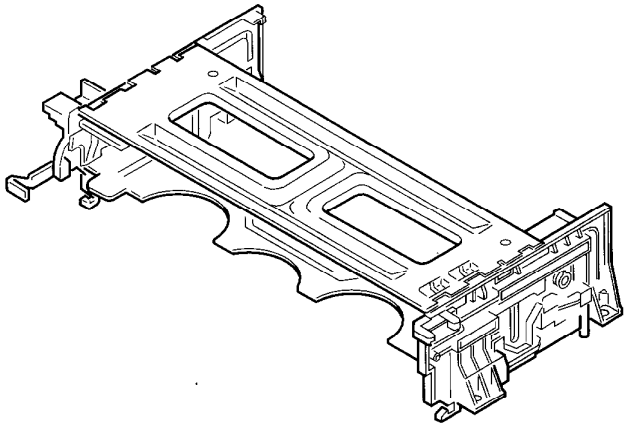
98B1637-1
Printed in Japan ©1998.2
Published by General Engineering Dept.
(Osaki East)

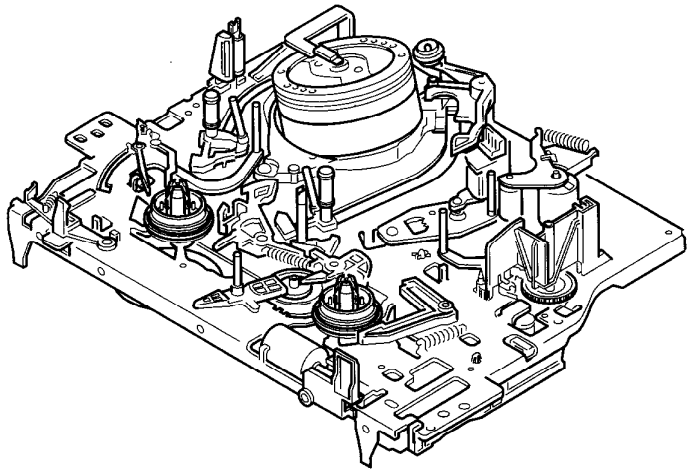
VHS MECHANICAL ADJUSTMENT MANUAL VI

S MECHANISM

VHS

Please use with the service manual.





VHS TAPE TRANSPORT MECHANISM DECK

MICROFILM

SONY®

ADJUSTMENTS REQUIRED THE FOLLOWING PARTS REPLACEMENT

PARTS / ADJUSTMENTS		4-1-1 TENSION REGULATOR POSITION/TENSION ADJUSTMENT	4-1-2 CHECKING THE TENSION AND TORQUE	4-1-3 X-VALUE ADJUSTMENT	4-1-4 HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6	4-1-5 ACE HEAD HEIGHT AND AZIMUTH ADJUSTMENT	4-1-6 X-VALUE FINE ADJUSTMENT	4-1-7 HEIGHT ADJUSTMENT OF GUIDE ROLLER NO. 8	4-1-8 CHECKING THE LINEARITY AND FLUCTUATION OF THE RF OUTPUT
3-25	REEL (S) TABLE	O	△	×	△	×	×	×	×
3-25	TG1 ASSEMBLY	O	×	×	△	×	×	×	×
3-6	FEH ASSEMBLY	×	×	×	△	×	×	×	×
3-23	DRUM BASE	×	×	O	O	O	O	O	O
3-2	DRUM ASSEMBLY	×	×	O	O	O	O	O	O
3-24	SHUTTLE (S) AND SHUTTLE (T) BLOCK ASSEMBLIES	×	×	O	O	O	O	O	×
3-5	ACE HEAD BLOCK	×	×	O	△	O	O	△	×
3-4	CAPSTAN MOTOR	×	×	×	△	O	O	O	×
3-3	PINCHI PRESS BLOCK ASS'Y	×	×	×	×	O	O	O	×
3-3	TG8 ASSEMBLY	×	×	×	×	×	×	O	×
3-10	REEL (T) TABLE	×	×	×	×	×	×	△	×
3-19	PULLEY GEAR ASSEMBLY	×	O	×	×	×	×	×	×
3-11	PENDULUM ARM ASSEMBLY	×	O	×	×	×	×	×	×

O: ADJUST
△: CHECK
×: NOT REQUIRED

1. PREPARATION FOR MECHANISM CHECKS, ADJUSTMENTS AND REPLACEMENT

For removal of the cabinet, printed wiring boards and others, please refer to the service manual "DISASSEMBLY".

1-1. LOADING AND THREADING PROCEDURE WHEN THE POWER TURNS OFF

1-1-1. LOADING AND THREADING PROCEDURE WITH HANDS

1) Turn cam motor in the arrow Ⓐ direction until loading and threading are end.

1-1-2. LOADING AND THREADING PROCEDURE WITH REGULATED DC POWER SUPPLY

1) Applying approx. +9V (300mA) to cam motor with regulated DC power supply makes it loading and threading.

Note : When loading and threading without cassette, claws are caught in four positions as following figure (in the order ①-②-③-④).
So release them with hands.

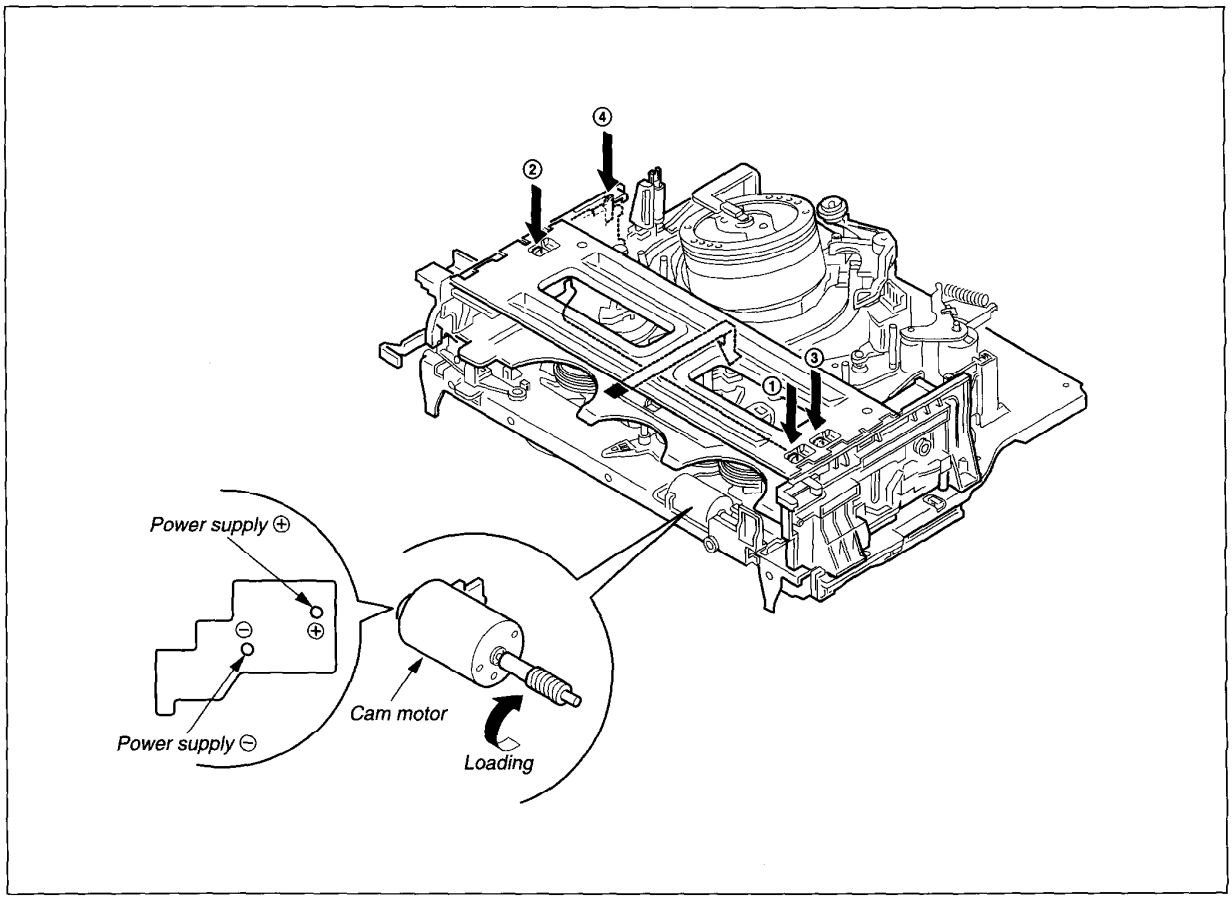


Fig. 1-1

1-2. UNLOADING AND UNTHREADING PROCEDURE WHEN THE POWER TURNS OFF

1-2-1. UNLOADING AND UNTHREADING PROCEDURE WITH HANDS

1) Turn cam motor in the arrow Ⓑ direction until unthreading is end.
2) Turn capstan motor in the arrow Ⓒ direction to take up tape in cassette.
3) Turn cam motor in the arrow Ⓑ direction until unloading is end.

1-2-2. UNLOADING AND UNTHREADING PROCEDURE WITH REGULATED DC POWER SUPPLY

1) Apply approx. +5V (300mA) to contrary polarities of cam motor.
2) Unthreading operation begins, tape guides return to their initial positions (Unthreading operation is end but tape remains), then stop cam motor by turning power off.

Note : When unloading begins and cassette lid is closed, turn cam motor in the arrow Ⓐ direction to open tape guard.

3) Turn capstan motor in the arrow Ⓒ direction to take up tape in cassette.

Note : Take care that tape is not caught at pinch roller.

4) Check that tape is no loosened completely, and apply approx. +5V (300mA) to contrary polarities of cam motor with regulated DC power supply.

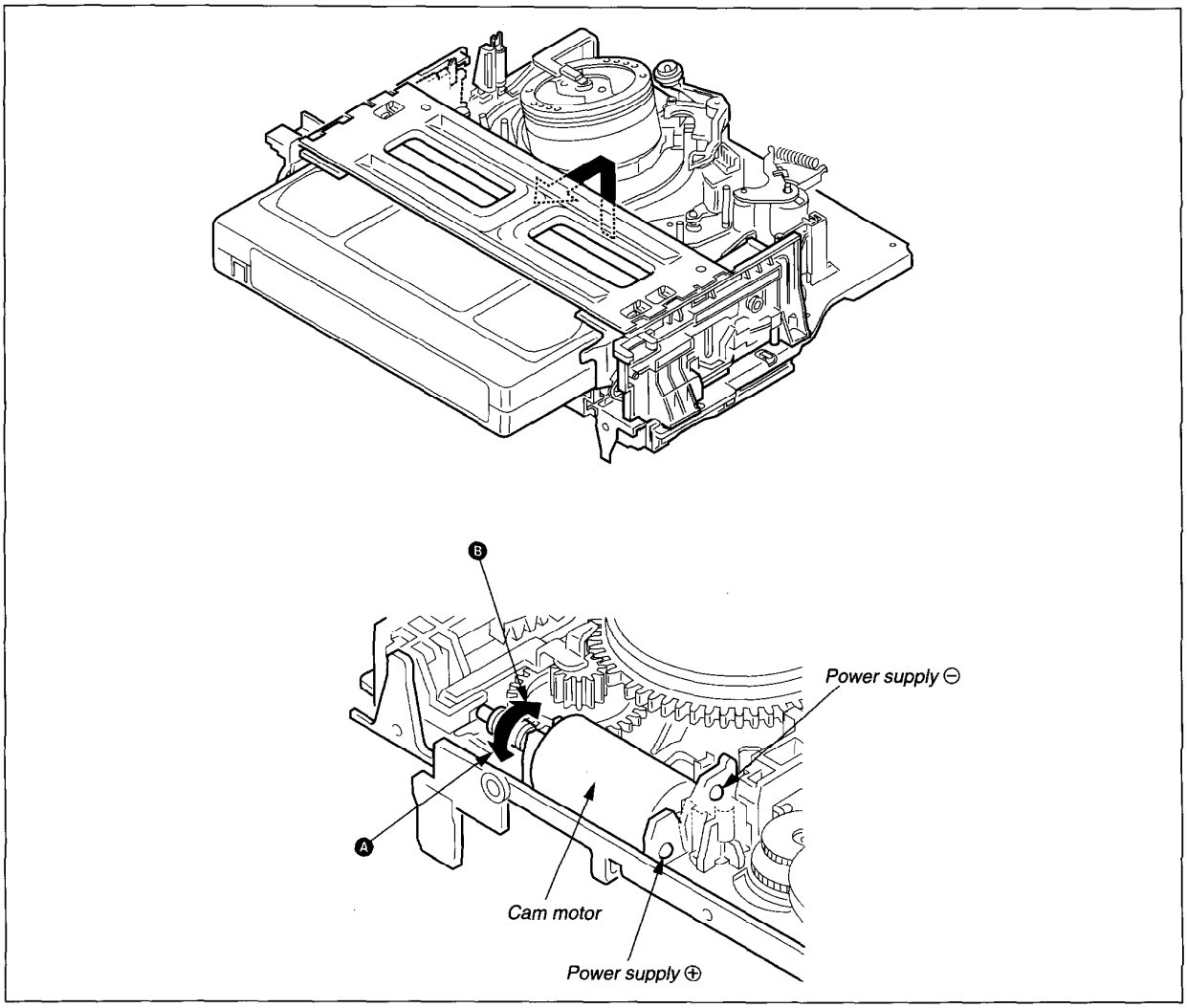


Fig. 1-2

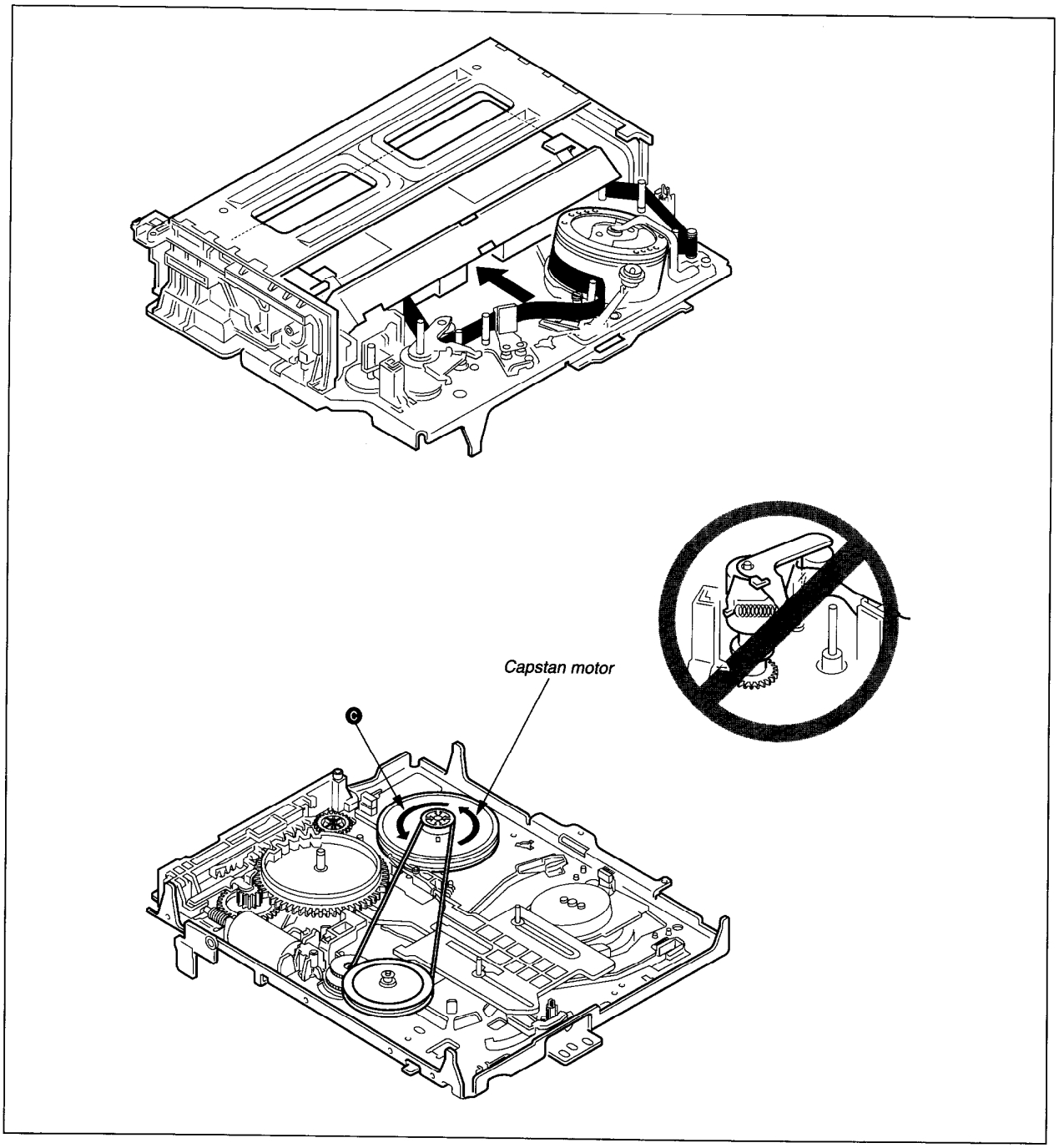


Fig. 1-3

1-3. HOW TO COMPLETE THREADING WITHOUT CASSETTE COMPARTMENT

Note 1 : Put the FL block assembly removed the FL top plate on the bottom not to put dust or grease the top sensor and the end sensor luminous plates or not to scratch them.

1) Pull out AC plug from wall outlet.
2) Shade near the end and top sensors with a black masking tape or the like.
3) Connect AC plug to wall outlet.

Note 2 : In this condition, some modes can not be set.
To make loading in this condition, set the video cassette tape without REC proof claw, pull the REC proof lever once and release it.
On loading without video cassette tape, it is necessary to deceive the microcomputer by turning the reel (T) table with hand.
Fast forward and rewind are not available.

Note 3 : After above mentioned operation, be sure to return the mode in the following order.

4) Pull out AC plug from wall outlet to reset the system control microcomputer.
5) Remove the tape near the end and top sensors.

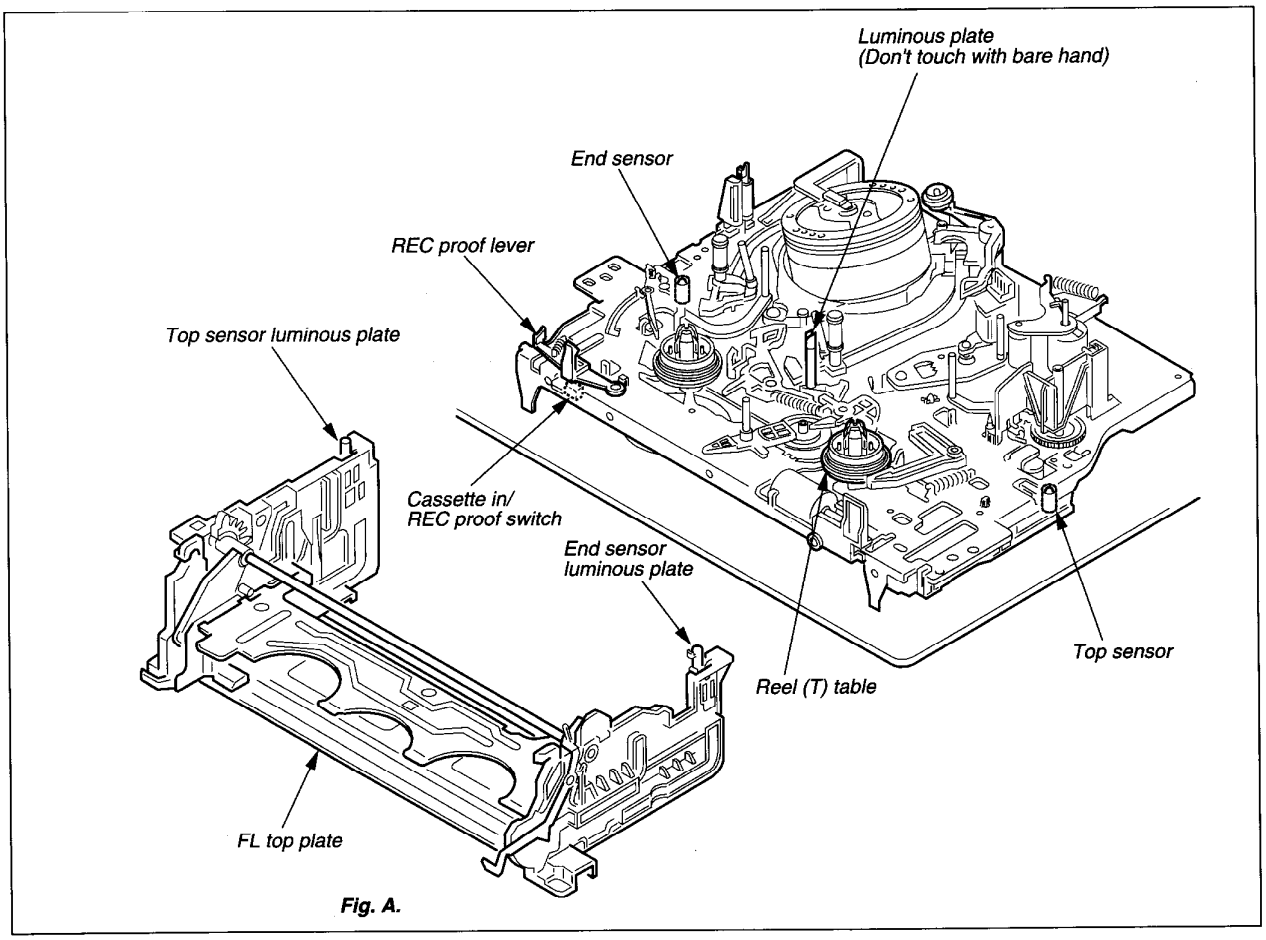


Fig. 1-4

2. PERIODIC CHECK AND REPLACEMENT

In order to obtain the best performance from this unit and make full use of its capabilities, and to extend the life of the unit and tapes, it is recommended that the following periodic checks and maintenance be performed.

* The following must be done after every repair regardless of how many hours the user has operated the machine.

2-1. CLEANING OF ROTATING HEAD DISK ASSEMBLY

1) Press a chamois cloth (Jig Ref. No. J-4) which has been dipped in cleaning fluid (Jig Ref. No. J-3) lightly against the rotating drum assembly, then do the cleaning by slowly rotating the rotating head disk by the hand. (Never try to clean by using the motor to turn it.)
2) Never try to clean by moving the chamois cloth at a vertical angle to the head tip. There is a very great danger of damaging the head tip if this is done.

2-2. CLEANING OF THE TAPE MOVEMENT SYSTEM

1) Clean the surfaces which the tape contacts during its movement (tape guide, drum assembly surface, capstan, pinch roller, etc.) with a chamois cloth that has been dipped in cleaning fluid.

2-3. CLEANING THE DRIVE SYSTEM

1) Clean the driving parts with a cloth that has been dipped in cleaning fluid.

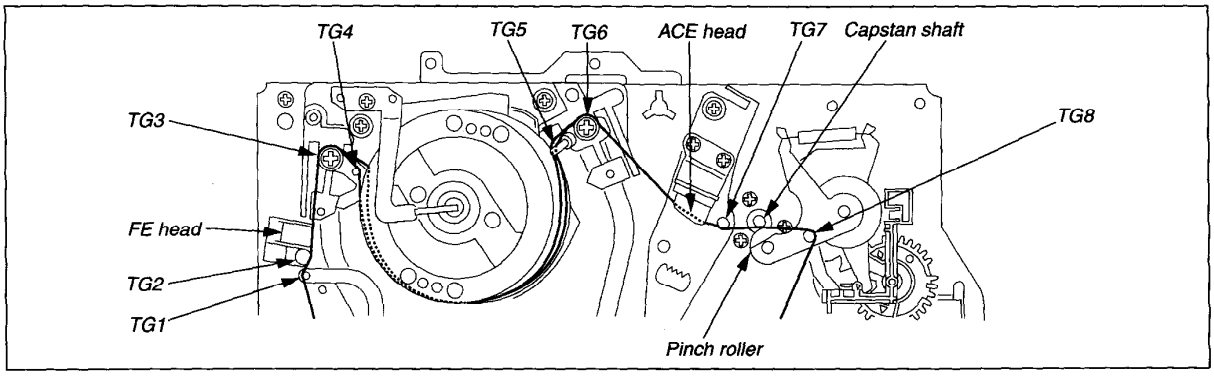


Fig. 2-1 Parts requiring cleaning

2-4. PERIODIC CHECK ITEMS

Perform the maintenance and check listed on the table below, according to users' operating hours.

Maintenance & Check \ Operating Hours (H)		500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	Remarks
Tape Transportation System	Cleaning of tape transportation system	O	O	O	O	O	O	O	O	O	O	This cleaning must be done whenever a repair is made.
	Cleaning and degaussing of ACE assembly	O	O	O	O	O	O	O	O	O	O	
	Cleaning and degaussing of upper drum assembly	O	O	O	O	O	O	O	O	O	O	The life of the head varies, depending on operational conditions and method.
Performance Confirmation	Abnormal sound	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust or replace the section which causes abnormal sound.
	Measurement of FWD back tension	—	☆	—	☆	—	☆	—	☆	—	☆	Confirmation must be made according to 4-1-1. Specified value : Adjust to 5.0504 to 6.5214mN•m (51.5 to 66.5g•cm) (without TC assembly*) or 3.7755 to 5.0994mN•m (38.5 to 52.0g•cm)(with TC assembly*)
	Confirmation of brake system	—	☆	—	☆	—	☆	—	☆	—	☆	Confirmation must be made according to section.
	Confirmation of record and playback functions	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Perform the confirmation whenever repair is made.
	Measurement of forward torque	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust to 4.9033 to 8.8259mN•m (50 to 90 g•cm)

Note : On overhaul
When overhauling the unit, replace parts as indicated in the above table.

O : Cleaning ☆ : Confirmation

2-5. TOOLS AND FIXTURES REQUIRED FOR SERVICING

Ref. No.	Name		Part No.	Caved Jig No.	Remarks
J-1	Torque Measurement Cassette VHT-103S		J-6090-072-A		For FWD & back tension torque measurement.
	Torque Measurement Cassette VHT-404S		J-6082-012-A		For CUE and REVIEW torque measurement.
J-2	Alignment Tape	KRV-52NE* (NTSC)	8-192-605-41		Tape path, Audio azimuth, X-value adjustments
		KRV-51N2 (NTSC)	8-192-605-32		Electrical adjustments, Operation checks
		KRV-52PL (PAL)	8-192-605-46		Tape path, Audio azimuth, X-value adjustments
		KRV-51P (PAL)	8-192-605-36		Electrical adjustments, Operation checks
J-3	Cleaning fluid		Y-2031-001-0	—	
J-4	Chamois Leather		2-034-697-00	—	
J-5	Dental Mirror (With Handle) Dental Mirror (Mirror)		J-6080-029-A J-6080-030-1	SL-5052	Tape path and tape traveling adjustments or checks.
J-6	FLOIL SG-646		7-651-000-44		Net. 20g
J-7	Diamond Oil NT-68		7-661-018-18		
J-8	Screw Lock G (1401B)		7-432-114-11		
J-9	X-value adjusting driver		J-6090-073-A		X-value adjustment
J-10	Mode Selector II		J-6082-282-A	—	For S mechanism stand-alone operation
J-11	Connector Conversion Jig		J-6090-052-A	—	For S mechanism stand-alone operation
J-12	S Type Capstan Board		J-6090-075-A	—	For S mechanism stand-alone operation

* Be sure to use KRV-52NE having version number.

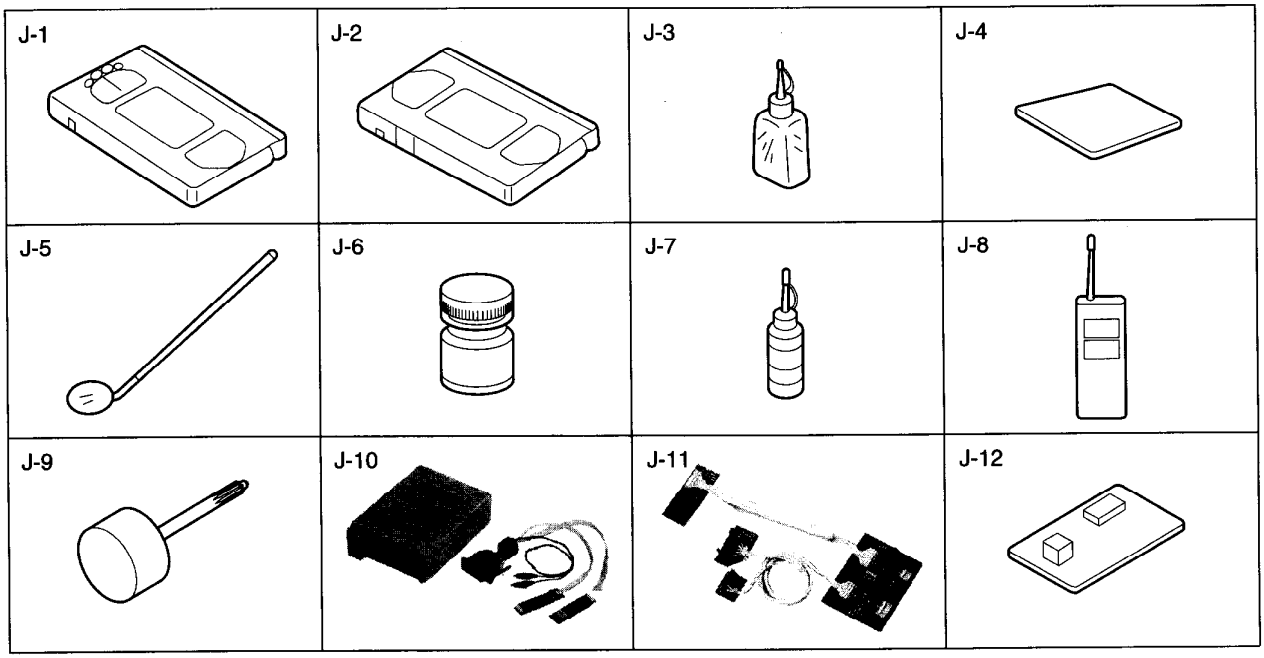


Fig. 2-2

2-6. HOW TO USE THE MODE SELECTOR II FOR ADJUSTING S TYPE MECHANISM ASSEMBLY

2-6-1. OUTLINE

To activate the VHS system S type mechanism assembly using mode selector II (J-6082-282-A), use connector conversion jig (J-6090-052-A) and the S type capstan board (J-6090-075-A). By using the connector conversion jig and the S type capstan board, the following operations are possible.

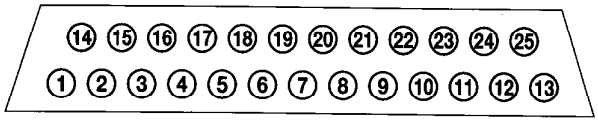
- Loading and unloading action by the loading motor.
- Normal and reverse rotation of the capstan motor.

2-6-2. PREPARATION

1) In order to drive the capstan motor, the power +5V and +12V are supplied from the Mode Selector II. Disassemble the D-SUB connector of the Mode Selector cable, then solder the following three places.

Supplied 3-pin cable	D-SUB connector of the Mode Selector II	Voltage
Pin 1 (Red index)	Pin 20	+12V
Pin 2	Pin 25	GND
Pin 3	Pin 24	+5V

- Connector pin number assignment of the D-SUB connector (From the soldering side)



- When connections are made, check that +5V and +12V are available at the 3-pin cable connector.

2) CHECKING THE SOFTWARE VERSION
Turn on the power of the Mode Selector II.
If the reading of the software version on the Mode Selector II is not 1.10 or higher, replace the new ROM (J-6082-314-A).

2-6-3. CONNECTION

1) S TYPE CAPSTAN BOARD ATTACHMENT
Replace the capstan board supplied with the connector conversion jig (J-6090-052-A) with the S type capstan board (J-6090-075-A).
2) CONNECTION BETWEEN THE CONNECTOR CONVERSION JIG AND THE MODE SELECTOR II.
Insert the connectors of the two 6-pin cables (one is white and the other is black) and the 3-pin cable from the Mode Selector II to the corresponding connectors on the connector conversion jig (J-6090-052-A).
3) CONNECTION BETWEEN THE CONNECTOR CONVERSION JIG AND THE S TYPE MECHANISM ASSEMBLY
With the power of the Mode Selector II turned off, insert the following two connectors to the corresponding connectors on the S type mechanism assembly.
   - 3-pin connector for the loading motor
   - 10-pin connector for the capstan motor

Set the speed control for the minimum setting (fully counterclockwise).

2-6-4. OPERATION

1) OPERATION OF THE LOADING MOTOR ON THE S TYPE MECHANISM ASSEMBLY
   ① Select the H type mechanism assembly setting on the Mode Selector II.
   ② Operating procedures after the mechanism selection
   For the operating procedures, see pages 3 to 5 of "8mm Video Mechanical Adjustment Manual IV (TK Mechanism) Supplement-1".
   For the loading procedure, see page 4 of "VHS Mechanical Adjustment manual IV (S Mechanism)".
2) OPERATION OF THE CAPSTAN MOTOR ON THE S TYPE MECHANISM ASSEMBLY
   ① By the loading motor operation under the item 1), change the mode setting to the FF/REW mode.
   ② Turn the speed control gradually in clockwise direction, then the capstan motor starts rotating. To turn the capstan motor in desired rotating direction, change the FF/REW setting of the rotating direction switch.

2-6-5. PRECAUTIONS

- Turn the speed control only when necessary. Otherwise, hold the speed control turned at fully counterclockwise direction. If the power of the Mode Selector II is turned on with the speed control turned in clockwise direction, +12V power fails and the power of the Mode Selector II cannot be turned on.
- Although the connector conversion jig (J-6090-052-A) has rubber feet, do not make a short circuit on the bottom surface of the connector conversion jig via peripheral conductive materials.

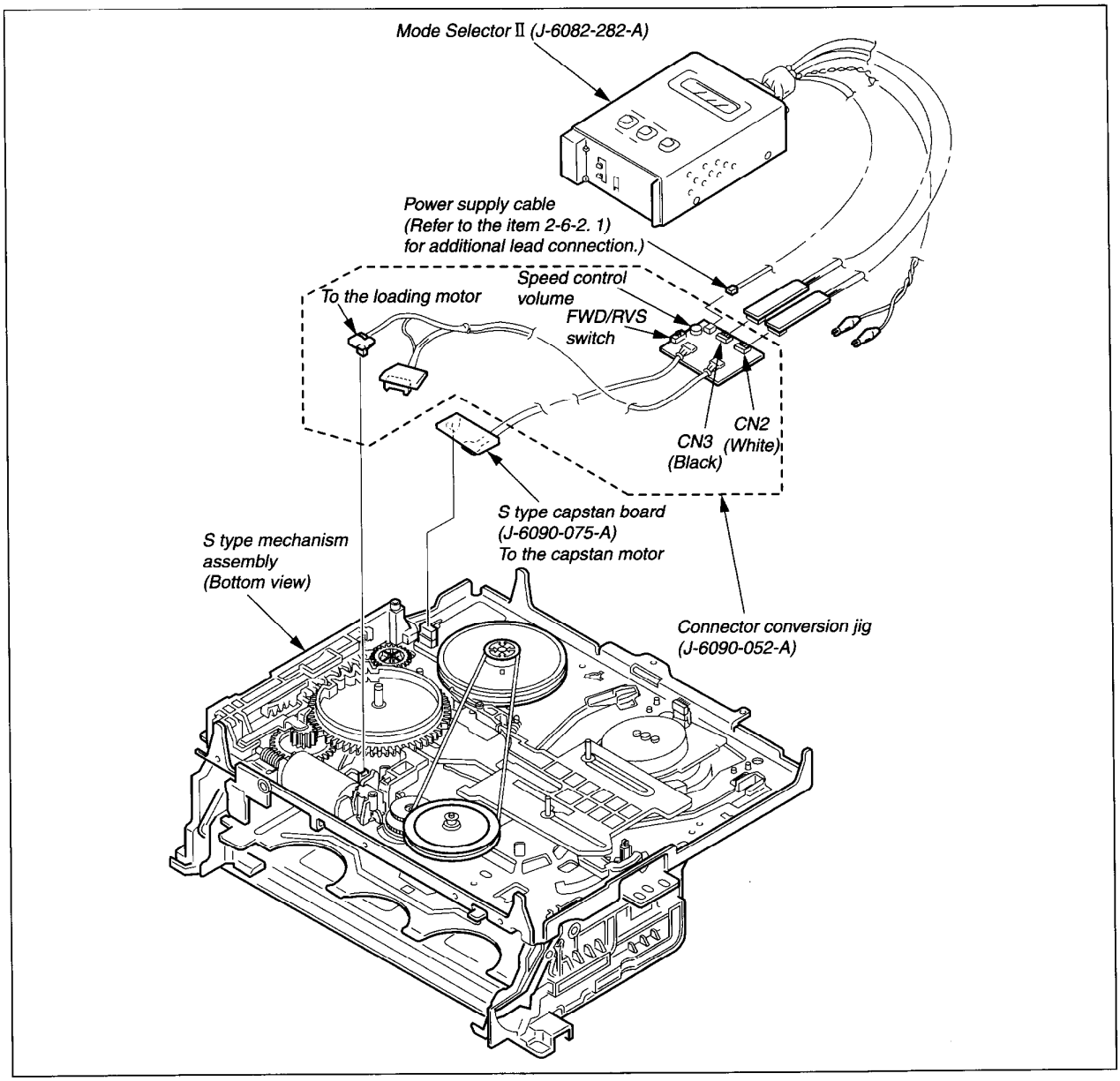


Fig. 2-3

2-6-6. CHECKING THE MECHANISM MODE BY THE MARK CARVED ON THE SLIDER

As shown in the right figure, the mechanism mode can be identified by checking the mark carved on the slider pointed by the loading gear shaft.

Carved mark	Mode
CD	Cassette down
EJ	Eject
UL	Unload end
LE	Load end
RV	Reverse
PR	Pinch release
FP	FWD pause
FW	FWD
ST	Stop
FR	FF/REW

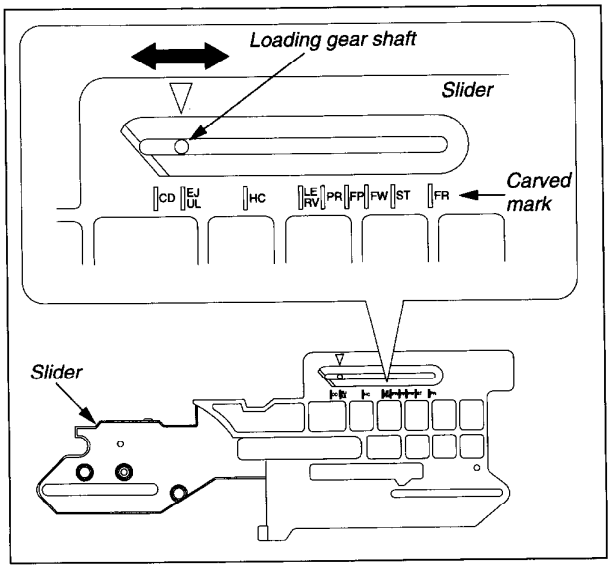


Fig. 2-4

2-7. PHASE ADJUSTMENT ON ATTACHING S TYPE MECHANISM ASSEMBLY

As shown below, adjust the phase between the rotary switch on the MA board and the cam gear.

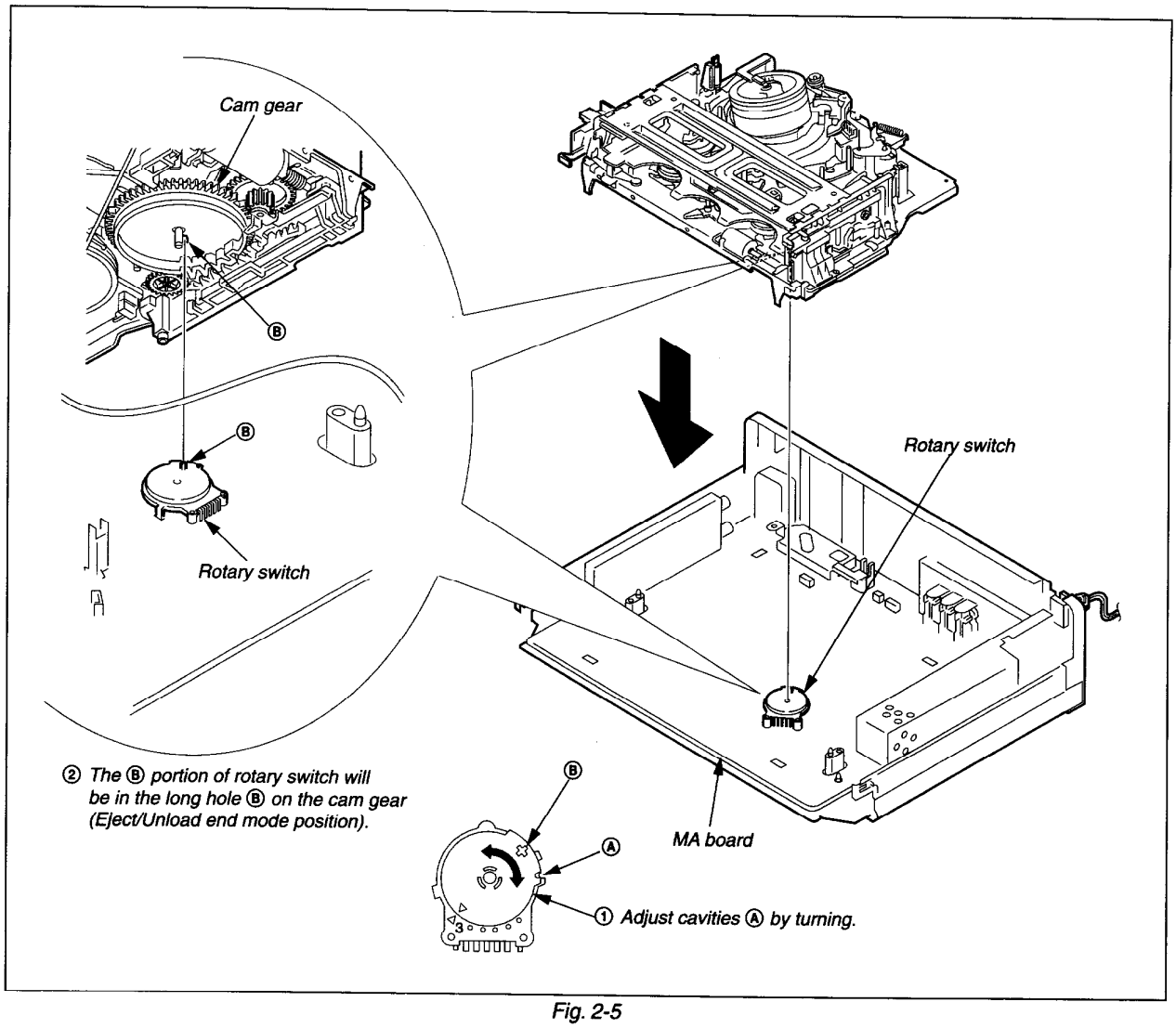

Cam gear
Ⓑ
Ⓑ
Rotary switch
Rotary switch
② The Ⓑ portion of rotary switch will be in the long hole Ⓑ on the cam gear (Eject/Unload end mode position).
Ⓑ
Ⓐ
① Adjust cavities Ⓐ by turning.
MA board

Fig. 2-5

3. MAINLY MECHANICAL PARTS REPLACEMENT

Notes:

For the removal of cabinets, printed circuit boards or the like, please refer to the "DISASSEMBLY" section on the service manual of the respective models.

To assemble the mechanical parts which are disassembled in the following sections, perform the disassembly steps in reverse, unless otherwise specified.

When replacing greased parts, grease them in the same way.

Do not oil, grease or touch with bare hands the surfaces that contacts tape of guides and brake shocs.

Install gears to engage each other.

Basically, disassembling and assembling should be done in the unthreading-end condition.

3-1. FL COMPLETE ASSEMBLY

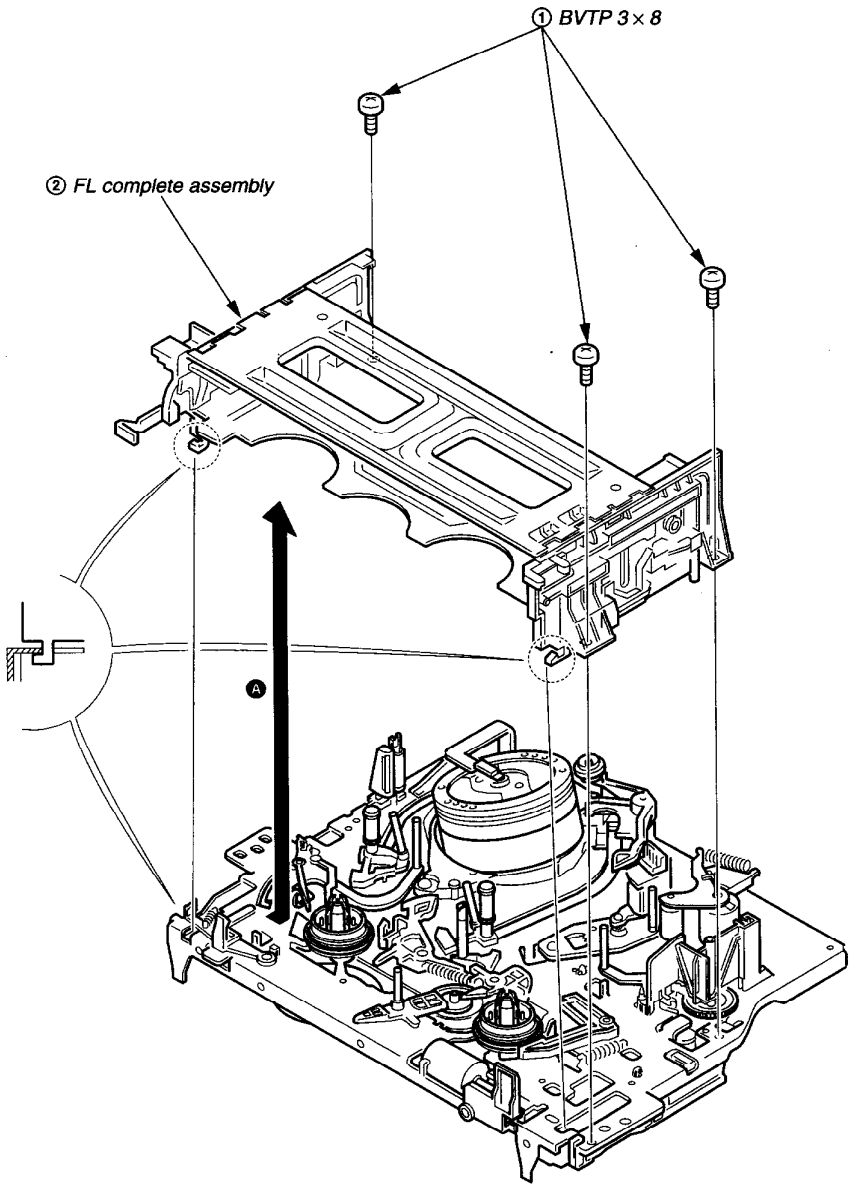
1) Remove screws (BVTP3 × 8) ①.
2) Remove FL complete assembly ② in the arrow Ⓐ direction.

Note : Be careful not to damage claws on the bottom and front.

3) Remove torsion spring (deck open) ③.
4) Remove luminous plate (top sensor) ④ and luminous plate (end sensor) ⑤.

[Note on Mounting]

- When mounting FL complete assembly, first insert claws on the bottom and front not to damage.
- Keep clean top sensor and end sensor luminous plates.



Screw tightening torque
① : 0.7845 ± 0.0784N•m (8.0 ± 0.8kg•cm)

Fig. 3-1

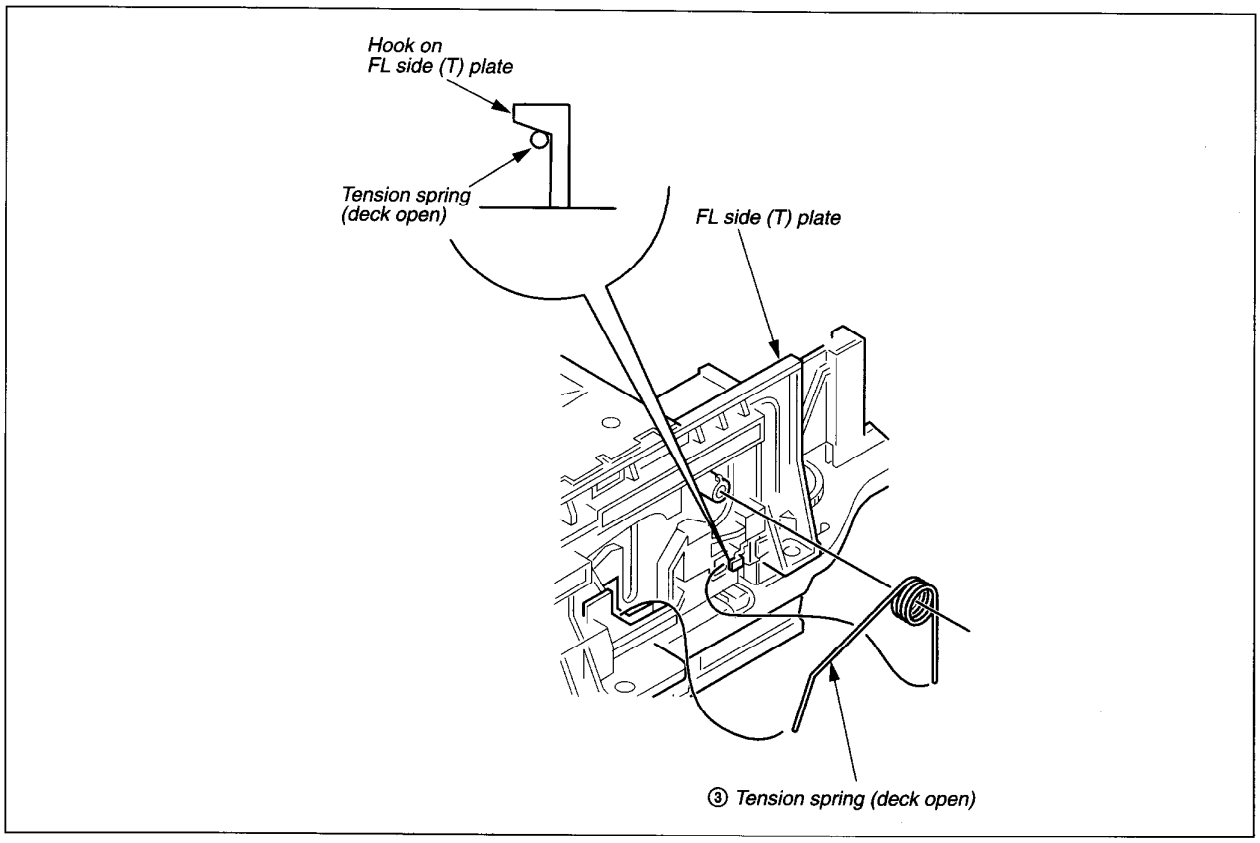

Hook on
FL side (T) plate
Tension spring
(deck open)
FL side (T) plate
③ Tension spring (deck open)

Fig. 3-2

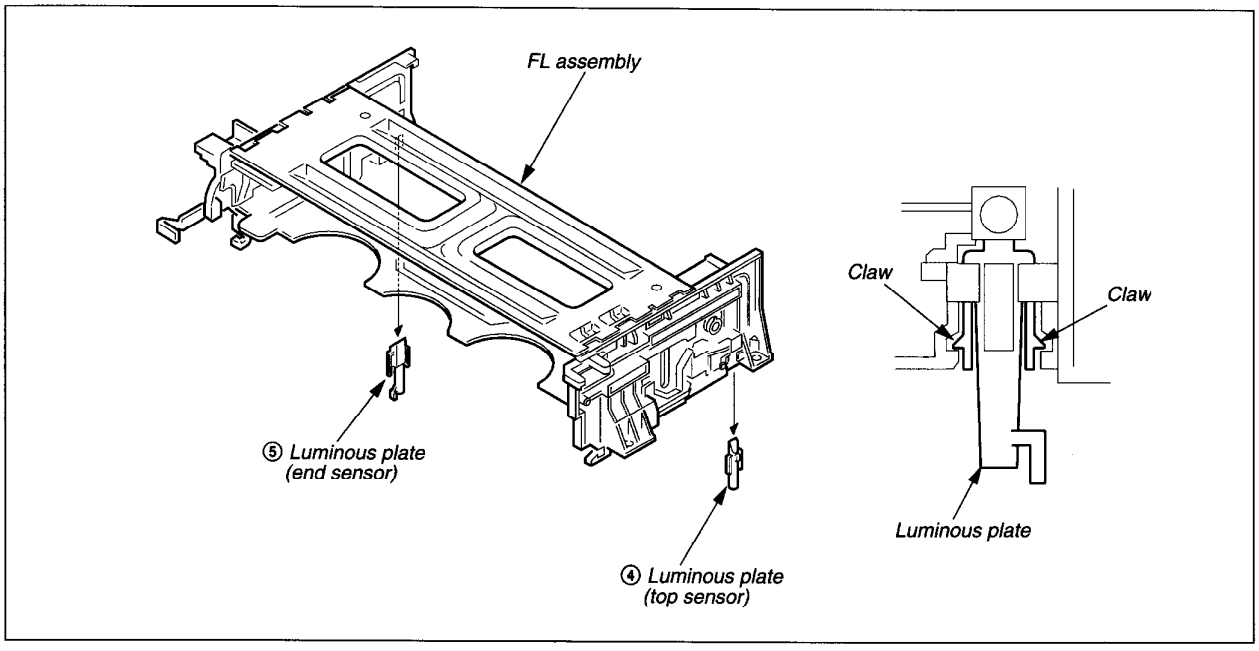

FL assembly
⑤ Luminous plate
(end sensor)
④ Luminous plate
(top sensor)
Claw
Claw
Luminous plate

Fig. 3-3

3-2. DRUM ASSEMBLY

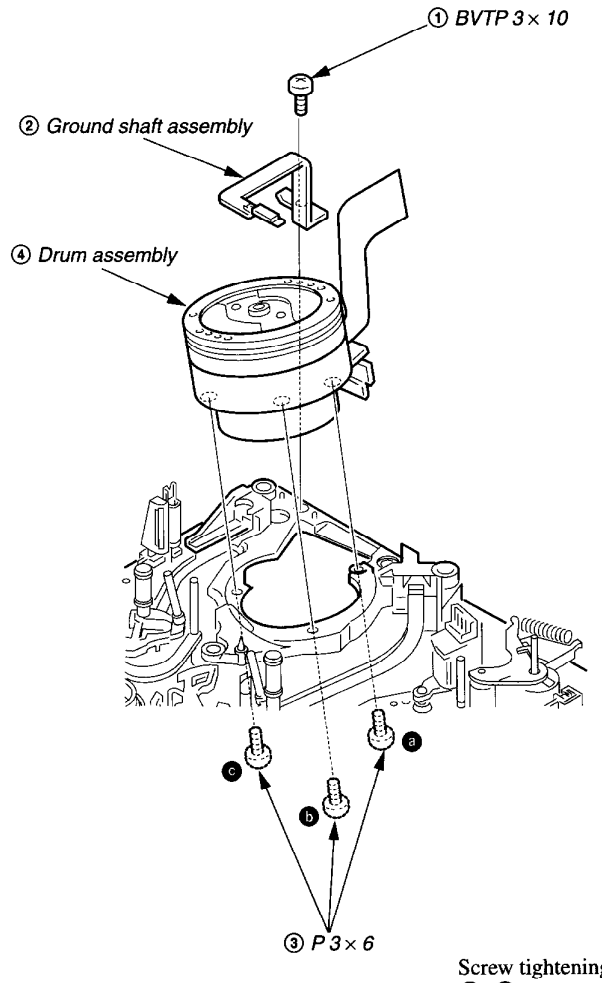
1) Remove screw (BVTP3 × 8) ①.
2) Remove ground shaft assembly ② not to touch its tip with bare hand.
3) Remove screws ③ to remove drum assembly ④.

[Notes on Mounting]

- Don't touch head chips and tip of ground shaft assembly with bare hand.
- Keep clean the surface that contacts tape of drum assembly.
- Tighten screw ③ in the order ⓐ, ⓑ, ⓒ.

[Adjusting after Mounting]

- 4-1. Tape path adjustment



Screw tightening torque
①, ③ : 0.4413 ± 0.0490N•m (4.5 ± 0.5kg•cm)

Fig. 3-4

3-3. PINCH PRESS BLOCK ASSEMBLY, TG8 ASSEMBLY AND THEIR PERIPHERY

1) Remove pinch press block assembly ① while releasing its tip from the claw of lid opener ②.
2) Remove lid opener ② while releasing claw in the arrow Ⓐ direction from mechanical chassis.
3) Remove elevator gear ③.
4) Remove TG8 assembly ④, TG8 arm gear ⑤ and TG8 arm driving gear ⑥.
5) Then remove pinch pressing gear ⑦.

[Notes on Mounting]

- When attaching pinch pressing gear ⑦ and elevator gear ③, be sure to adjust their phases as shown in Fig. A.
- Apply grease to elevator gear ⑦ and pinch shaft as shown in Fig. B.
- Don't touch surface of pinch roller with bare hand.

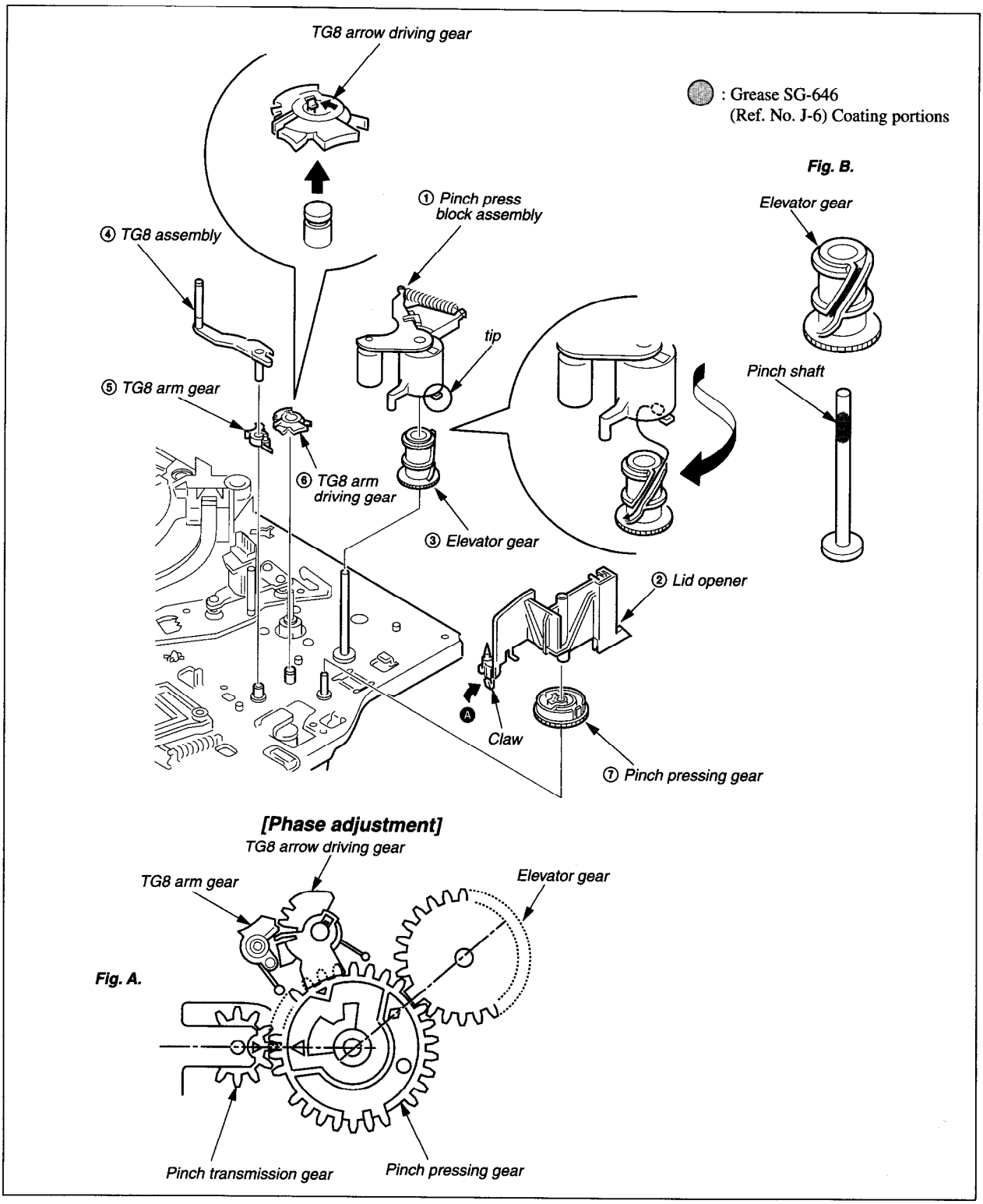


Fig. 3-5

3-4. RUBBER BELT, CAPSTAN MOTOR

1) Remove rubber belt ①.
2) Remove screws ② to pull out capstan motor ③.

[Notes on Mounting]

- Attach rubber belt not to twist it.
- Don't touch capstan motor with bare hand to keep clean capstan motor.
- Tighten screws ② in the order ⓐ, ⓑ, ⓒ.

[Adjustment after Mounting]

- 4-1. Tape path adjustment.

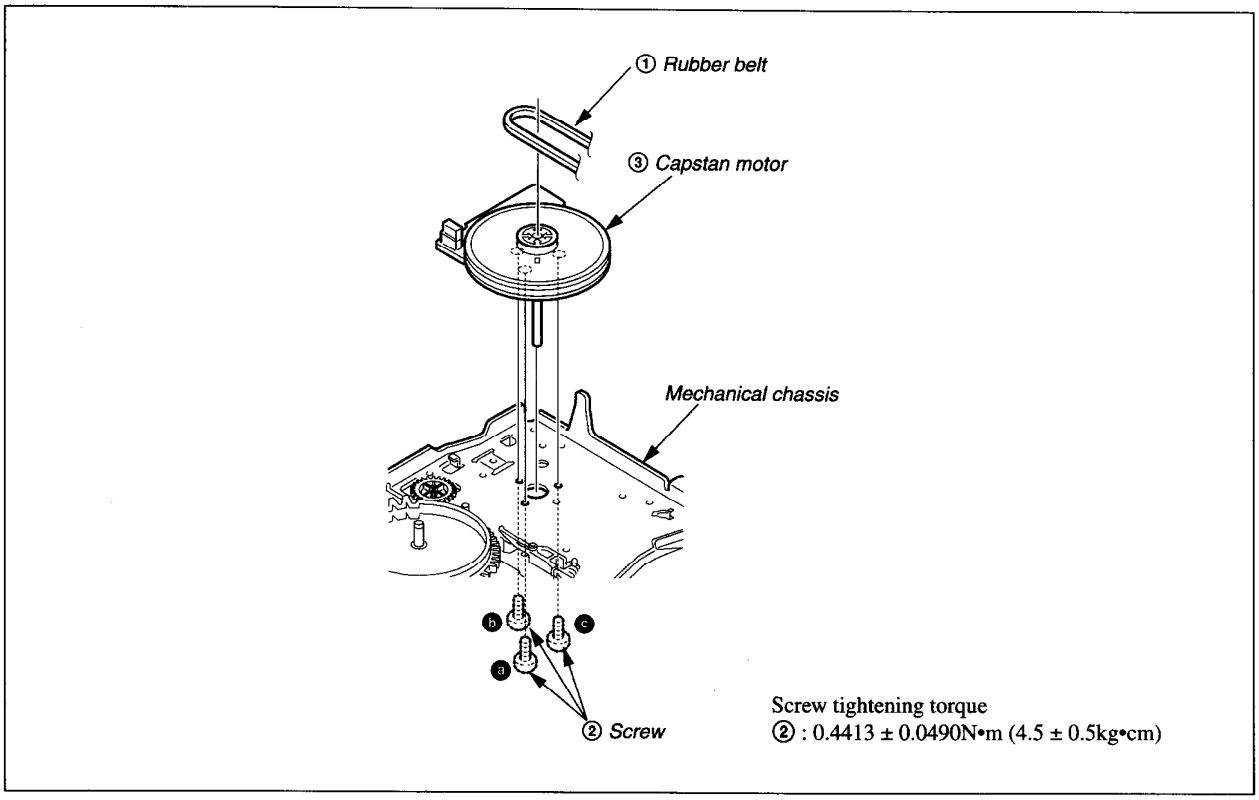


Fig. 3-6

3-5. ACE HEAD BLOCK ASSEMBLY

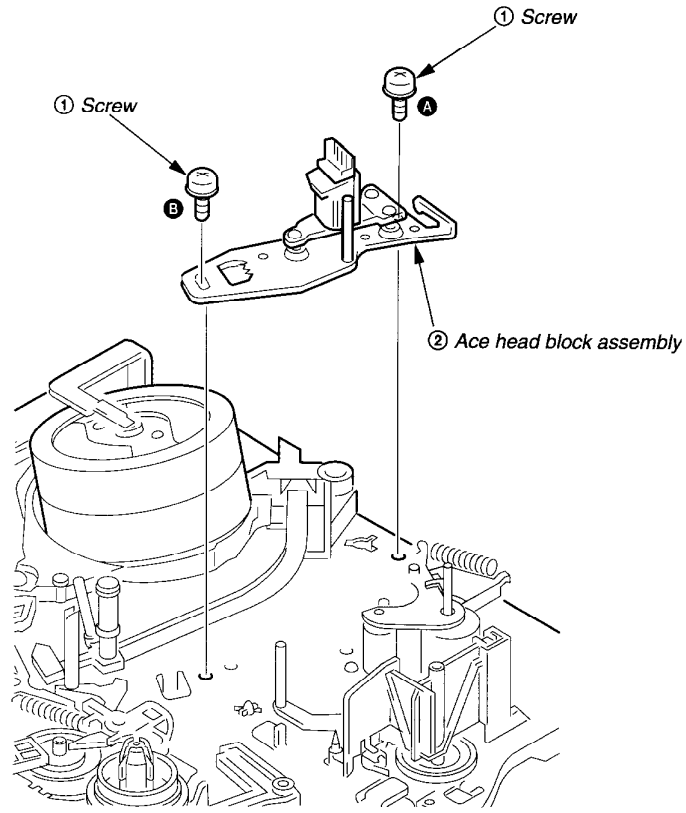
1) Remove screws ① to remove ACE head block assembly ②.

[Notes on Mounting]

- Don't touch capstan motor with bare hand to keep clean capstan motor.
- On tightening screws ①, first, tighten in the order Ⓐ, Ⓑ, next loosen Ⓑ 180 degrees or more and perform adjustments. After adjustments tighten with torque screwdriver (torque; 0.29 ± 0.29 N•m (3.0 ± 0.3kg•cm)).

[Adjustment after Mounting]

- 4-1. Tape path adjustment.



Screw tightening torque
① : 0.7845 ± 0.0784N•m (8.0 ± 0.8kg•cm)

Fig. 3-7

3-6. FEH ASSEMBLY

1) While putting the boss out from mechanical chassis, turn FEH assembly ① in the arrow Ⓐ direction and pull out FEH assembly above.
2) Slide FE head ② out from FEH holder not to break claw (Recorder only).
3) Remove TG2 shaft ③ by pushing with a screwdriver covered with cloth or the like not to scratch the surface.

[Note on Mounting]
• Don't touch FE head and TG2 shaft with bare hand.

[Adjustment after Mounting]
• 4-1. Tape path adjustment.

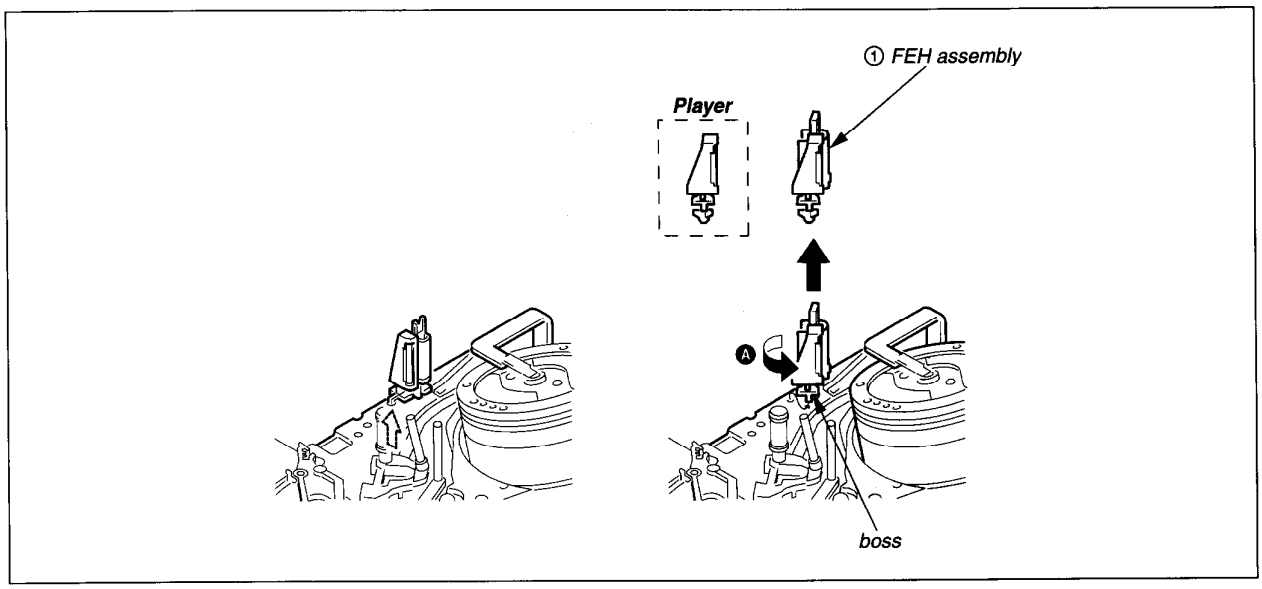


Fig. 3-8

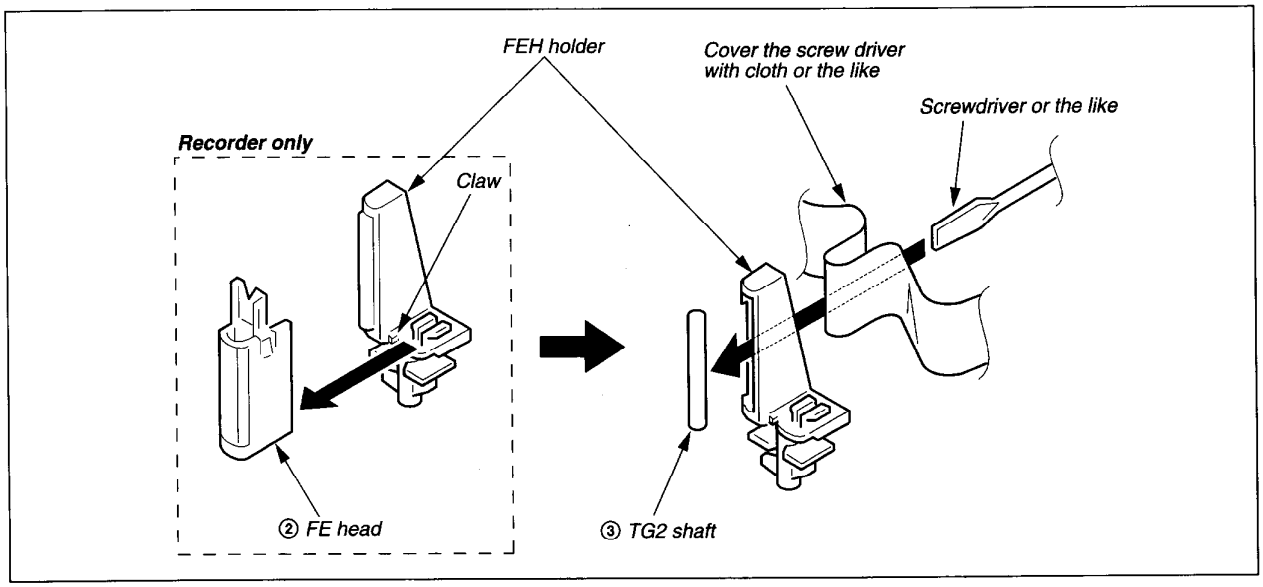


Fig. 3-9

3-7. REC PROOF LEVER

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove tension spring (REC proof) ①.
3) Remove REC proof lever ② in the arrow Ⓑ by pushing claw in the arrow Ⓐ direction.

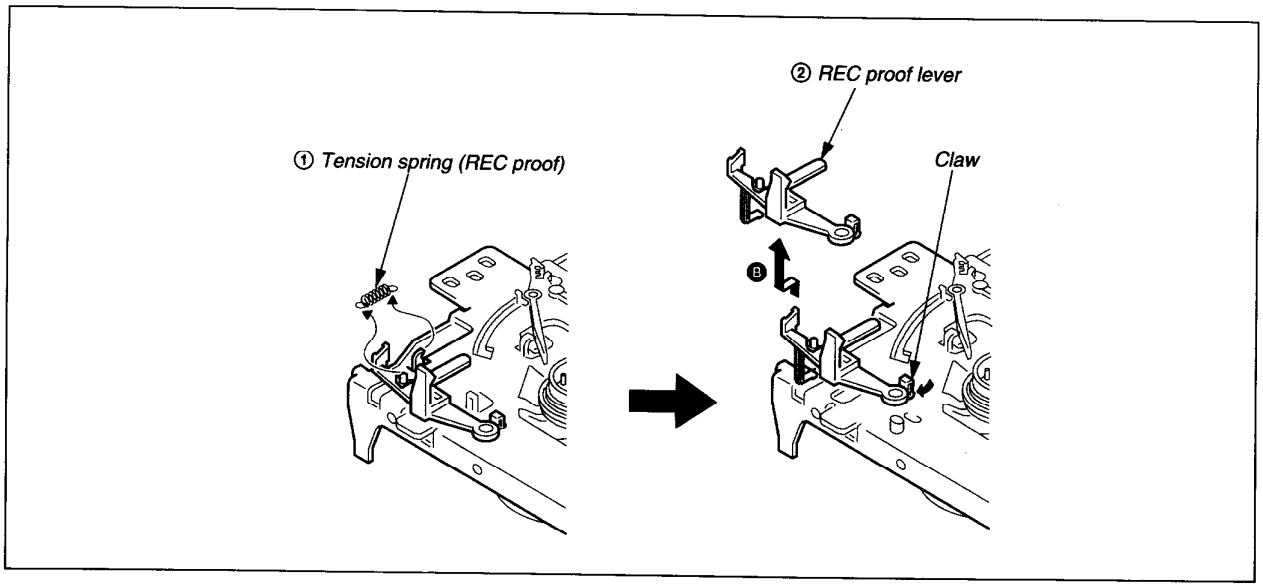


Fig. 3-10

3-8. RVS BRAKE ARM ASSEMBLY

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove extension spring (RVS brake) ①.
3) Turn RVS brake arm assembly ② in the arrow Ⓐ direction and remove it in the arrow Ⓑ.

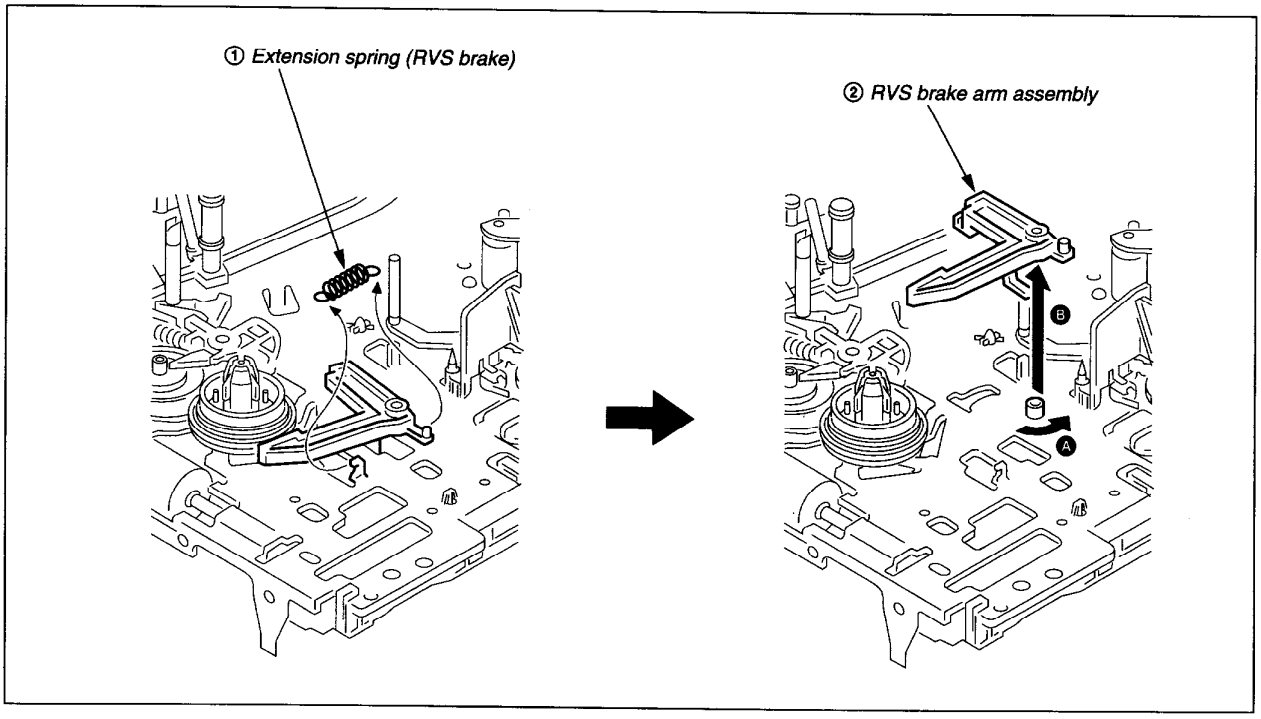


Fig. 3-11

3-9. MAIN (S) AND MAIN (T) BRAKE ASSEMBLIES

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove extension spring (main brake) ①.
3) Turn main (S) brake assembly ② in the arrow Ⓐ direction and remove it in the arrow Ⓑ.
4) Turn main (T) brake assembly ③ in the arrow Ⓒ direction and remove it in the arrow Ⓓ.

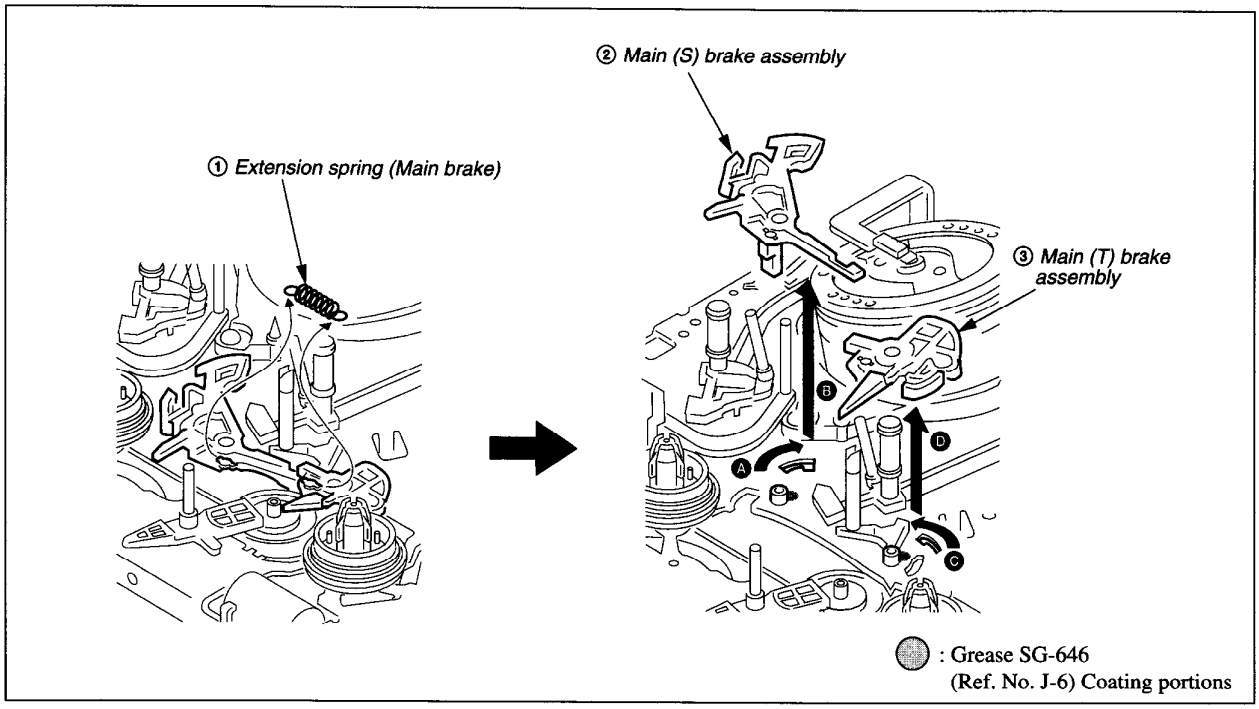


Fig. 3-12

3-10. REEL (T) TABLE (BLACK)

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove stopper washer ① to pull reel (T) table ② out.
3) Remove thrust washer ③.

[Note on Mounting]

• Before attaching, confirm the oil is applied at the top of reel (T) shaft.

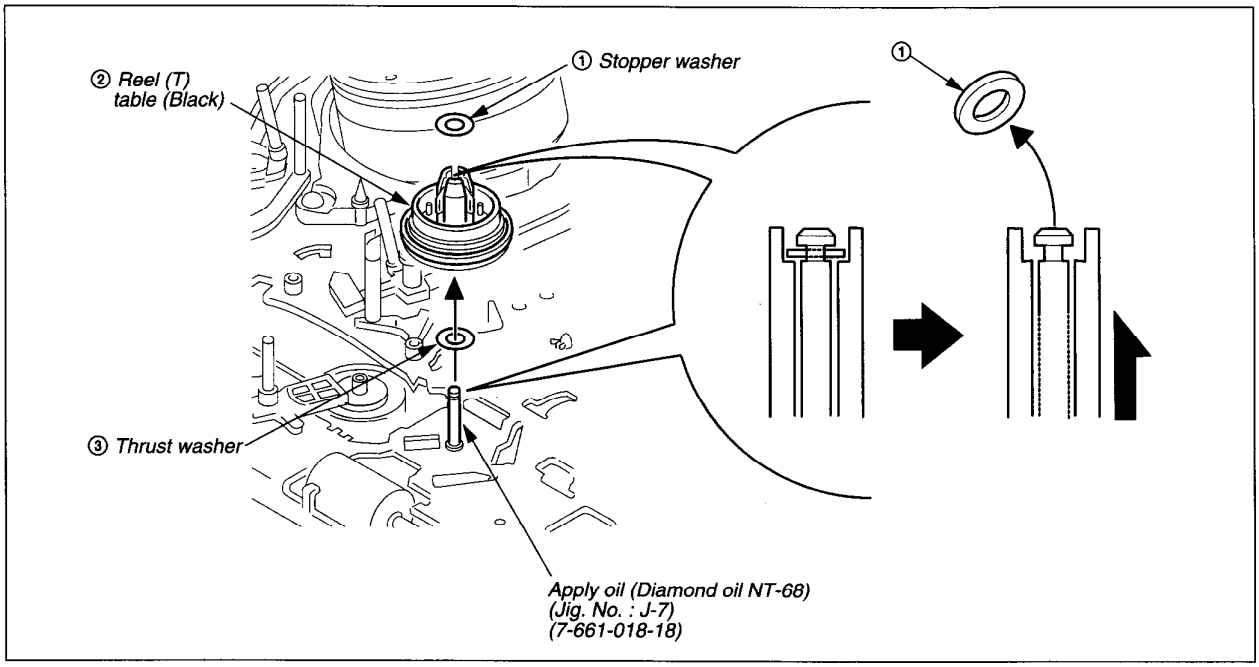


Fig. 3-13

3-11. PENDULUM ARM ASSEMBLY

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove main (S) and main (T) brake assemblies. (Refer to 3-9.)
3) While releasing claws from the pendulum arm shaft in the arrow A direction, pull out pendulum arm assembly ①.

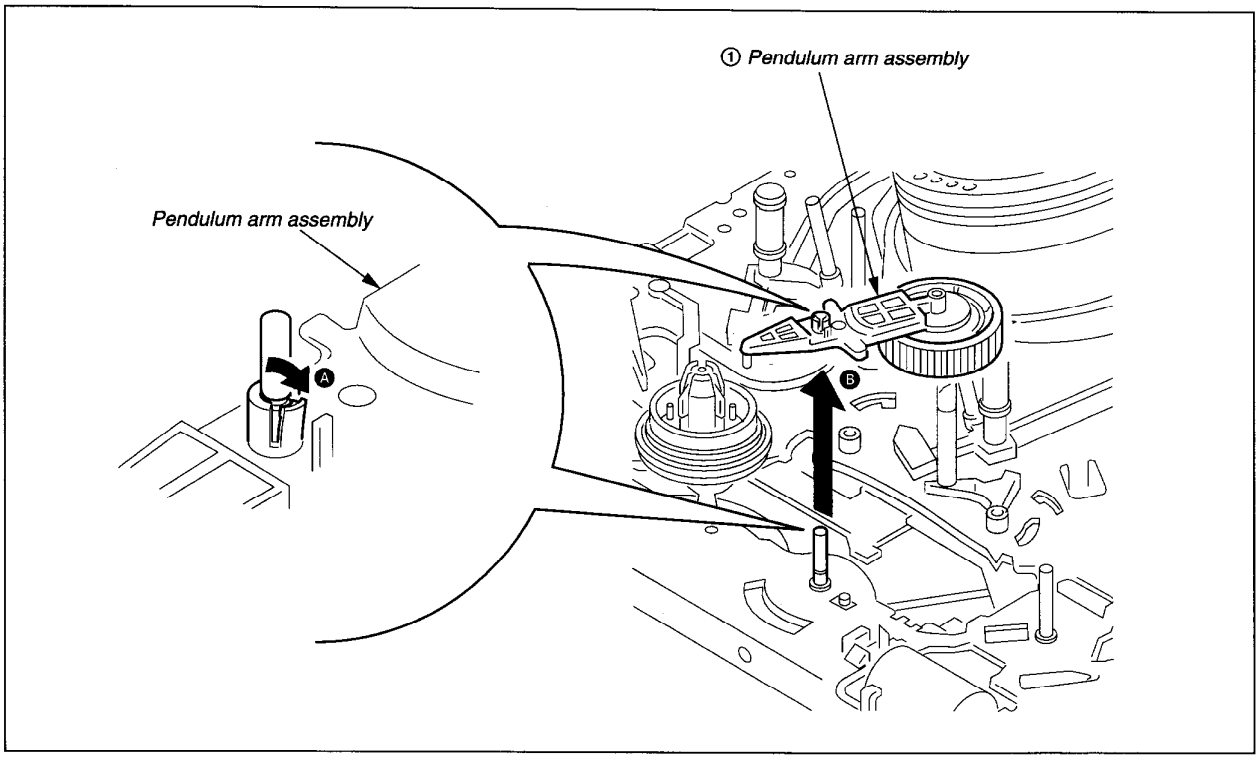


Fig. 3-14

3-12. FL SLIDER BLOCK ASSEMBLY

1) Remove FL complete assembly. (Refer to 3-1.)
2) Set the mechanism deck upside down.
3) Remove a screw (BVTP 3 × 8) ① and then retainer plate ② is getting out of place.
4) Slide FL slider block assembly ③ off in the arrow Ⓐ direction and raise it up.

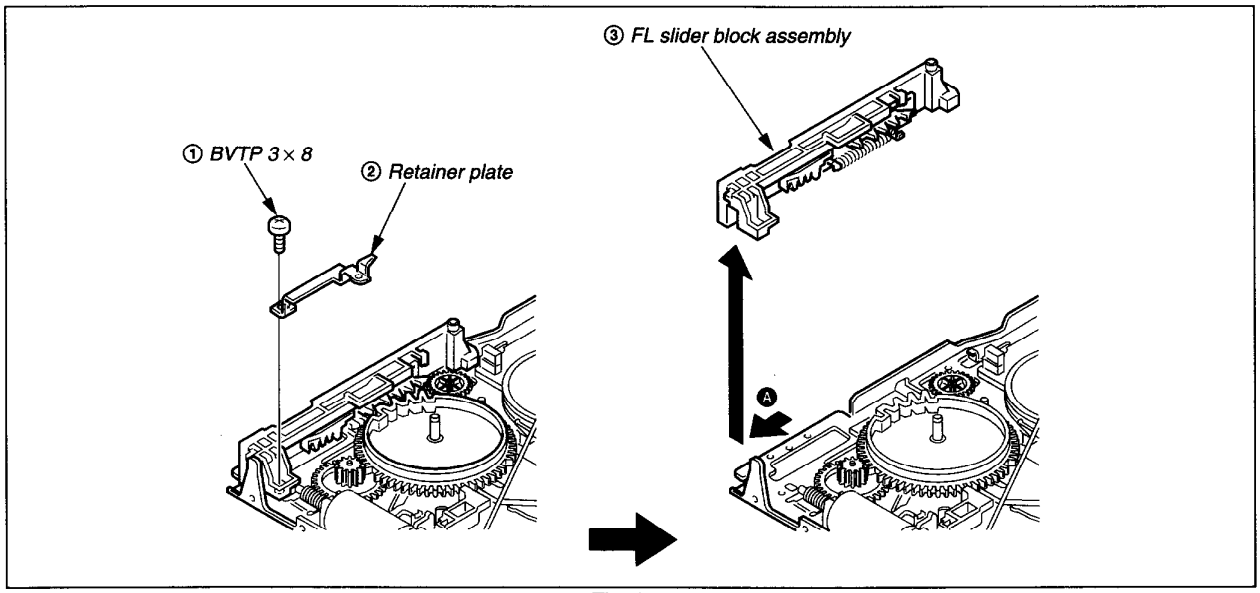


Fig. 3-15

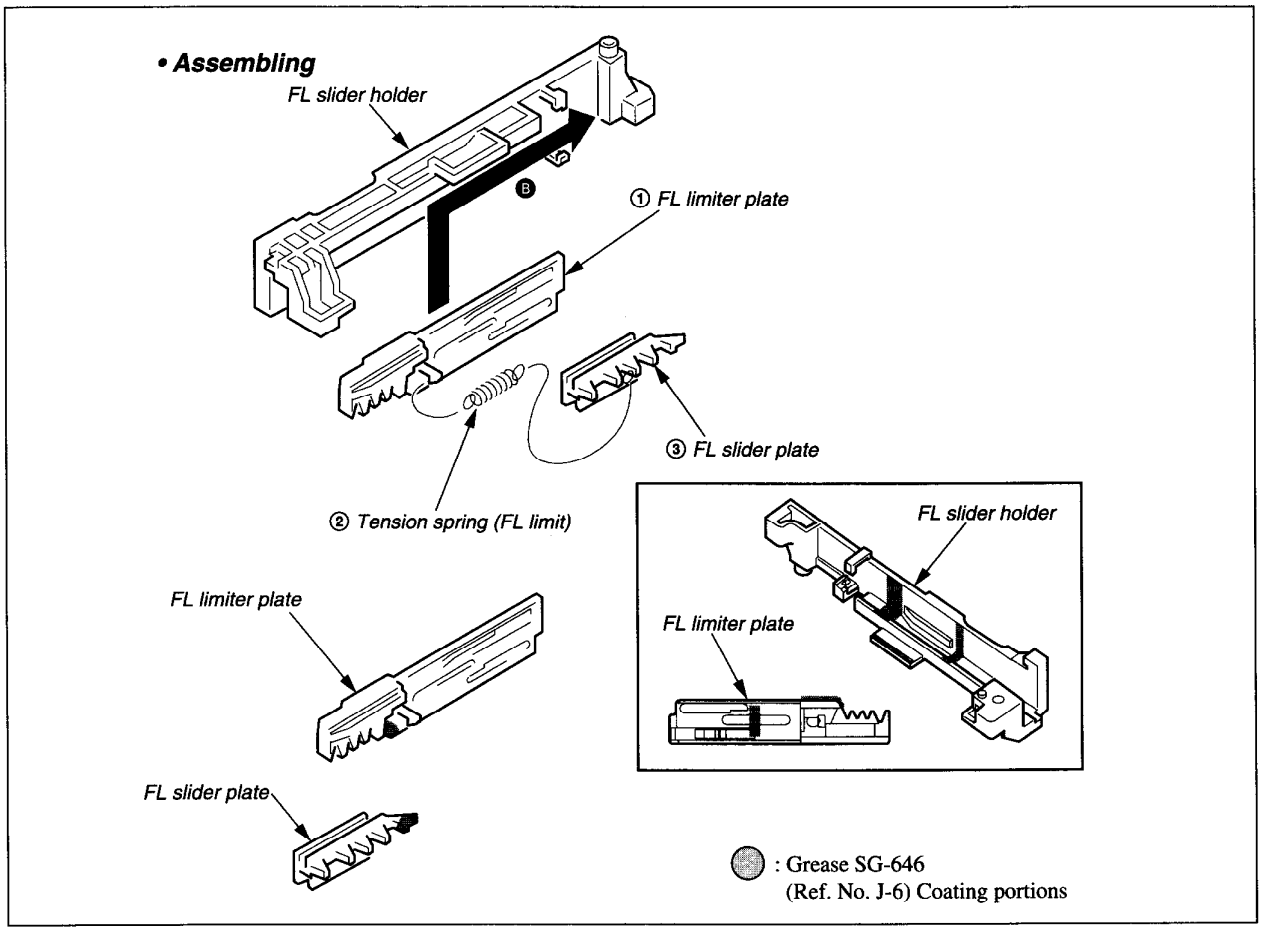


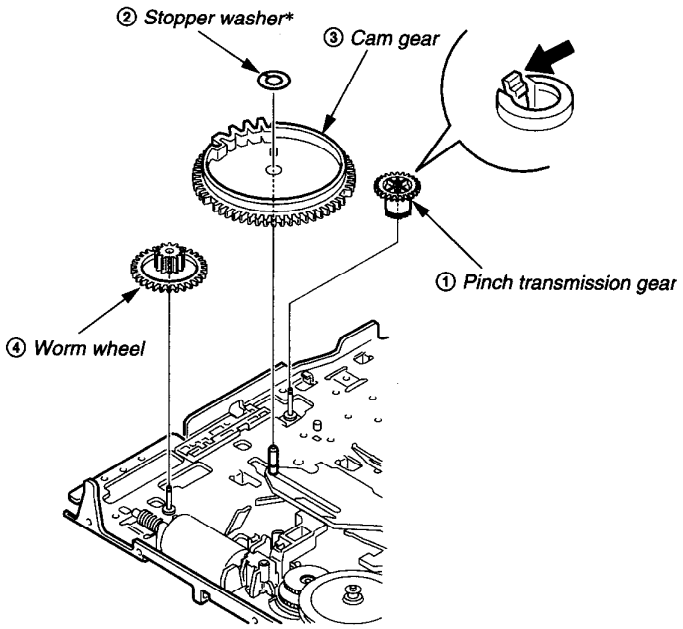
Fig. 3-16

3-13. PINCH TRANSMISSION GEAR, CAM GEAR, WORM WHEEL

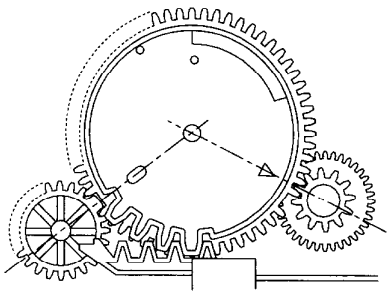
1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove FL slider block assembly. (Refer to 3-12.)
3) Remove pinch transmission gear ① by putting off its claw from shaft.
4) Remove stopper washer ②* to pull out cam gear ③.
5) Remove worm wheel ④ by putting off its claw from shaft.

[Note on Mounting]

- Before attaching cam gear ③, confirm that the specified locations are coated with grease SG-646 (Ref. No. J-6).
- Adjust the phase of gears each other.



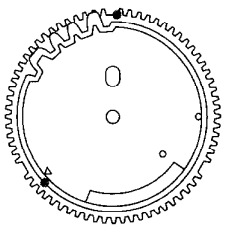
• Phase adjustment



: Grease SG-646 (Ref. No. J-6) Coating portions

*Once remove stopper washer ②, don't use it again. Replace it with new one.

[Top]



[Bottom]

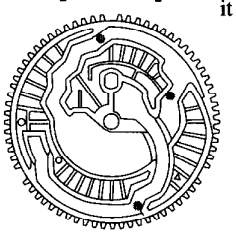


Fig. 3-17

3-14. CAPSTAN BRAKE ASSEMBLY, CAPSTAN BRAKE SHAFT

1) Remove rubber belt. (Refer to 3-4.)
2) Remove cap brake spring ①.
3) Remove capstan brake assembly ② by putting off claw of capstan brake shaft ③.
4) Set the mechanical chassis bottom side down.
5) While pushing the boss of capstan brake shaft ③, turn it clockwise to remove it.

[Note on Mounting]

• Don't touch shoe of capstan brake assembly with bare hand.

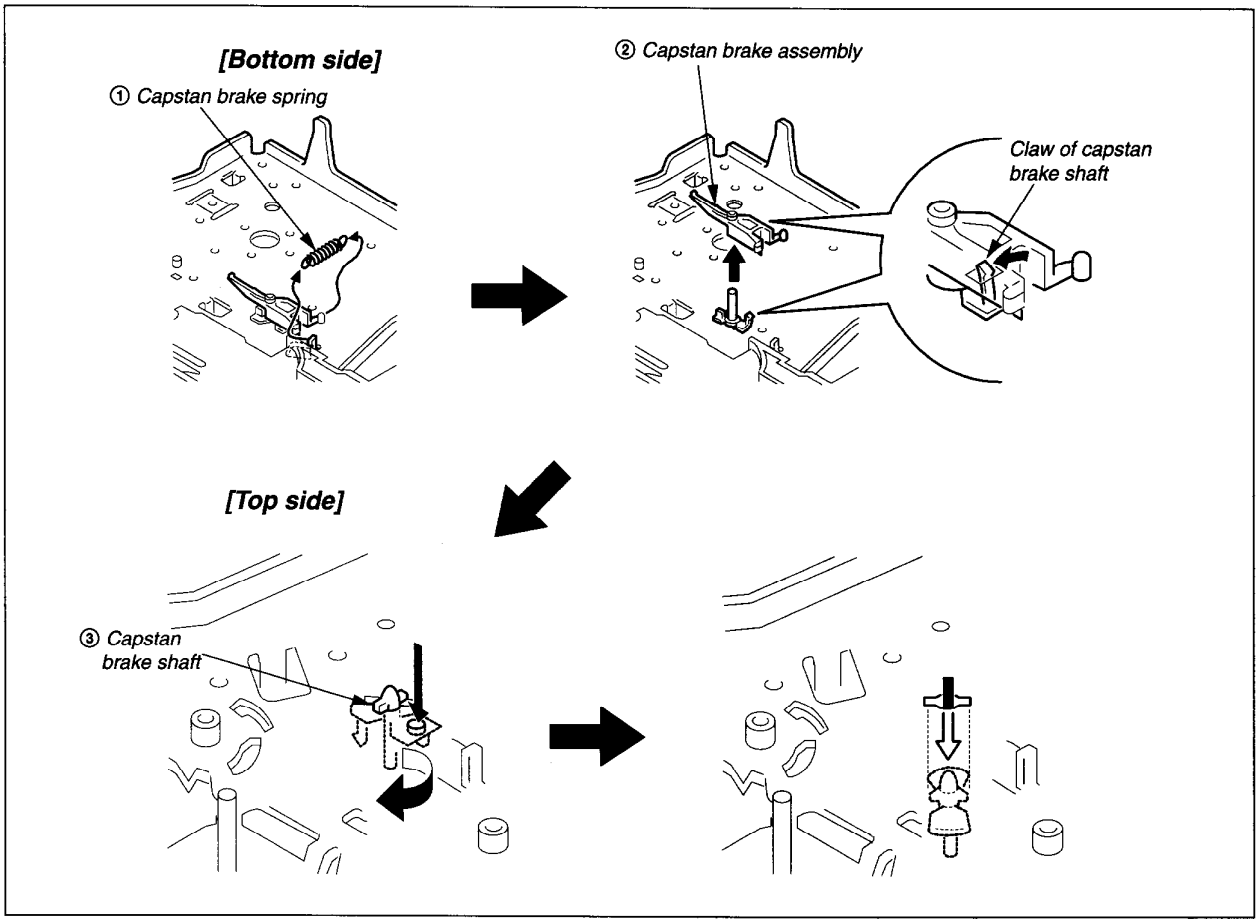


Fig. 3-18

3-15. FL SLIDER GUIDE

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove FL slider block assembly. (Refer to 3-12.)
3) Remove FL slider guide ① while pushing claws in the arrow Ⓐ direction.

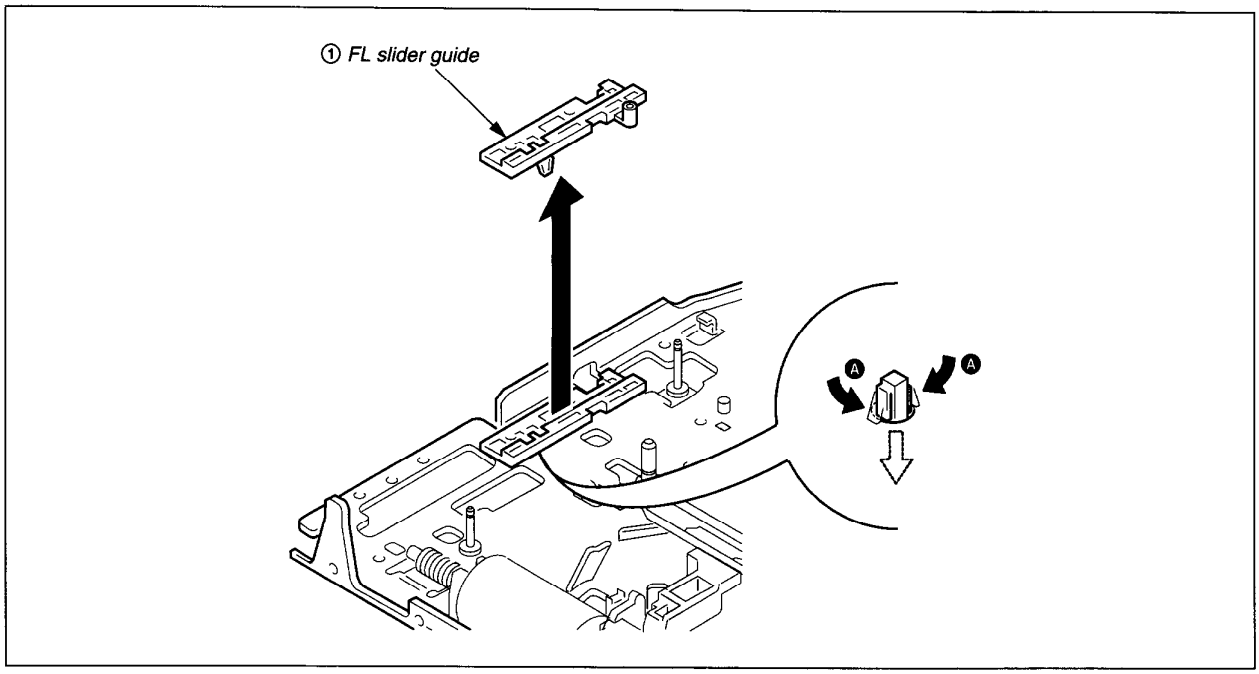


Fig. 3-19

3-16. SLIDER

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove rubber belt. (Refer to 3-4.)
3) Remove FL slider block assembly. (Refer to 3-12.)
4) Remove cam gear. (Refer to 3-13.)
5) Remove stopper washers ① and remove slider ② in the arrow direction.

[Note on Mounting]

- Before attaching slider ②, confirm the specified locations are coated with grease SG-646 (Ref. No. J-6).
- When attaching slider ②, adjust "Δ" mark on slider to loading gear (T) shaft as shown in Fig. A.

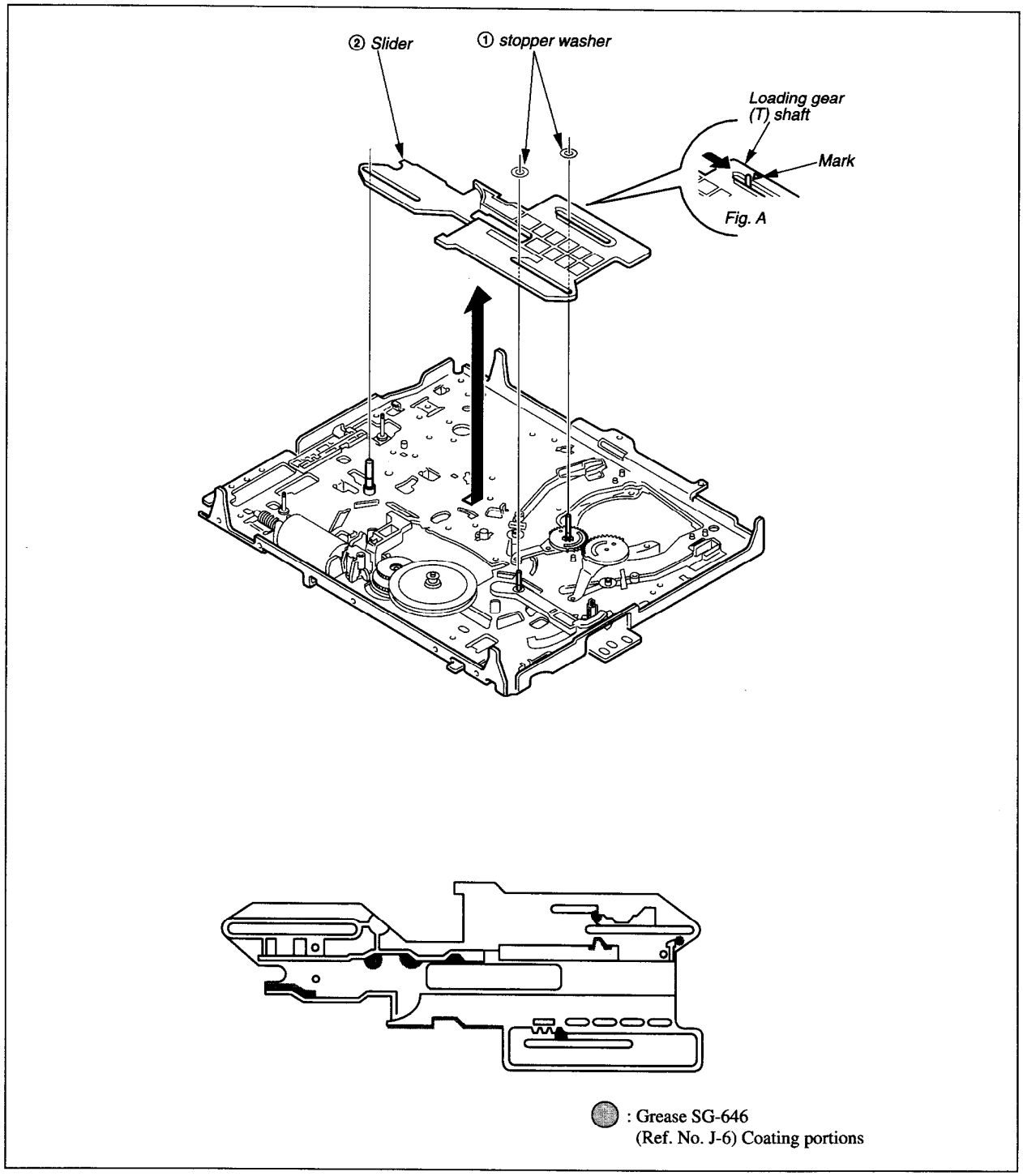


Fig. 3-20

3-17. TG1 DRIVING ARM

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove rubber belt. (Refer to 3-4.)
3) Remove FL slider block assembly. (Refer to 3-12.)
4) Remove cam gear. (Refer to 3-13.)
5) Remove slider. (Refer to 3-16.)
6) Remove spring (power tension) ① from TG1 driving arm ②.
7) Remove TG1 driving arm ② by turning it in the arrow Ⓐ to Ⓑ direction.

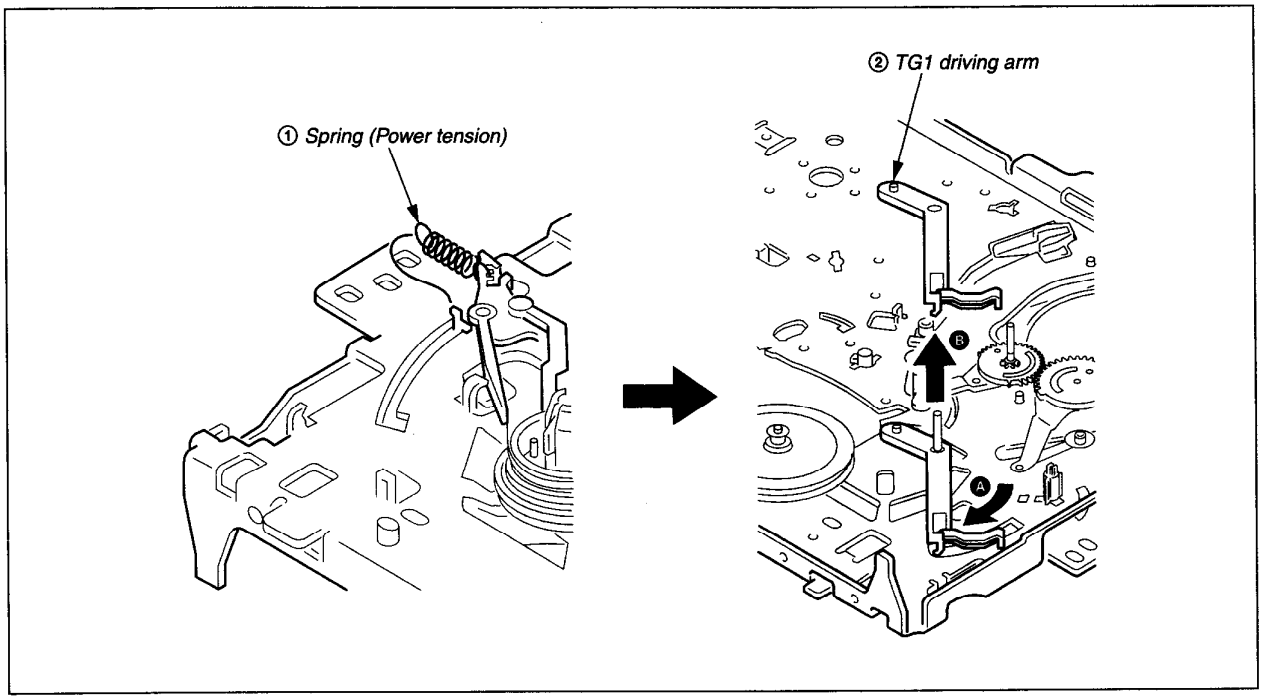


Fig. 3-21

3-18. LOADING (T) AND LOADING (S) GEAR ASSEMBLIES

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove rubber belt. (Refer to 3-4.)
3) Remove FL slider block assembly. (Refer to 3-12.)
4) Remove cam gear. (Refer to 3-13.)
5) Remove slider. (Refer to 3-16.)
6) Remove loading (T) gear assembly ① and loading (S) gear assembly ② in the arrow direction.

[Note on Mounting]

• When attaching them, be sure to adjust the phase each other.

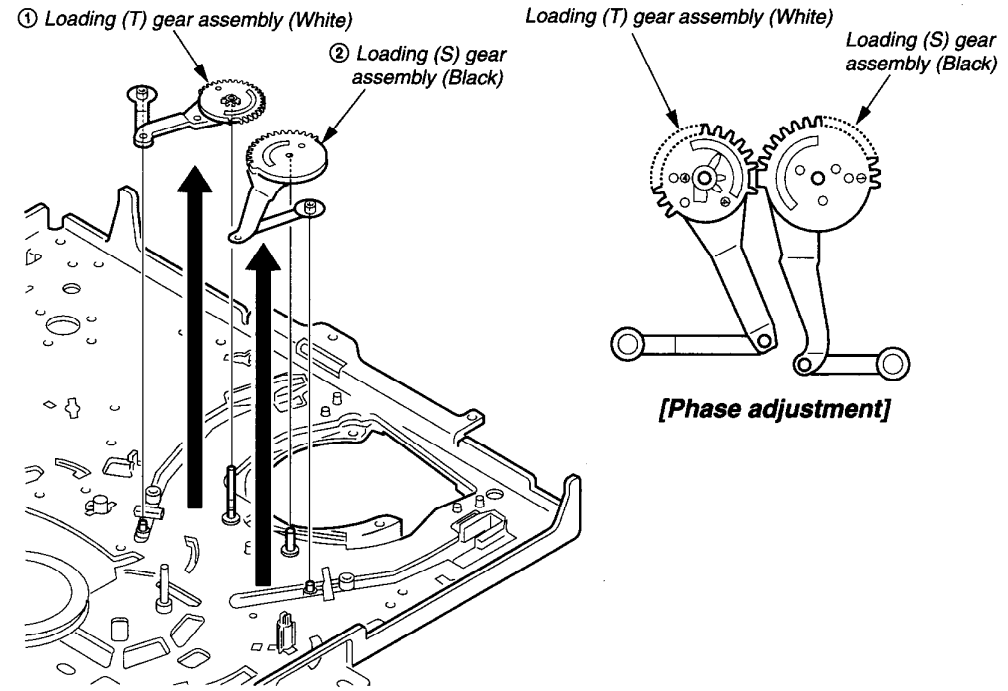

① Loading (T) gear assembly (White)
② Loading (S) gear assembly (Black)
Loading (T) gear assembly (White)
Loading (S) gear assembly (Black)
[Phase adjustment]

Fig. 3-22

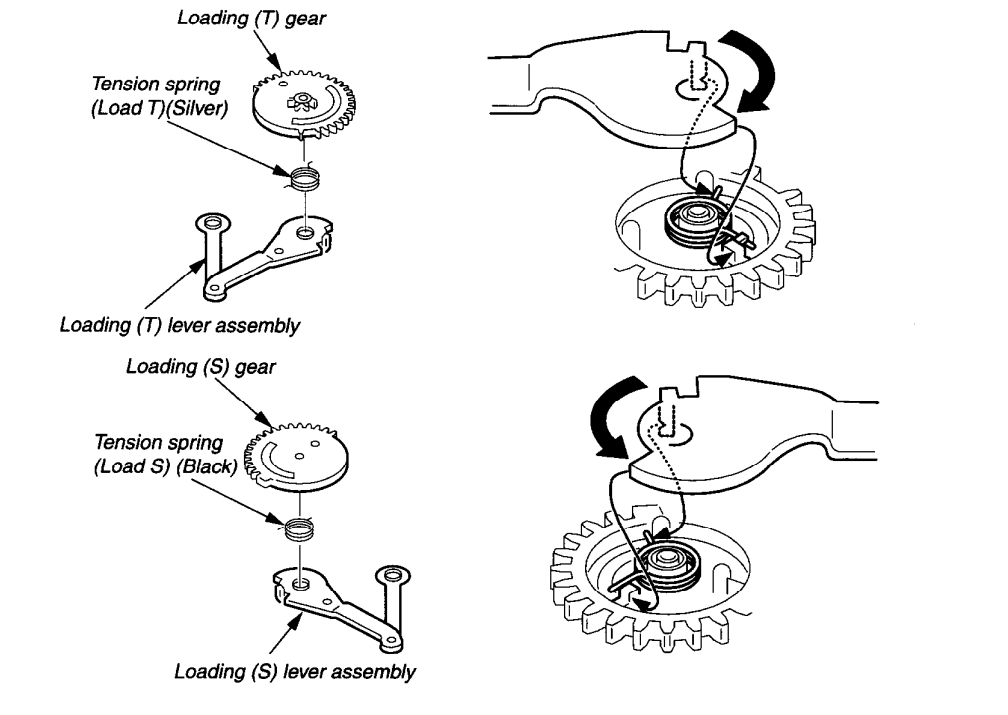


Fig. 3-23

3-19. PULLEY GEAR ASSEMBLY, CLUTCH GEAR

1) Remove rubber belt. (Refer to 3-4.)
2) Remove stopper washer ①.
3) Remove pulley gear assembly ② with clutch gear ③.

[Note on Mounting]
• When attaching them, don't insert strongly.

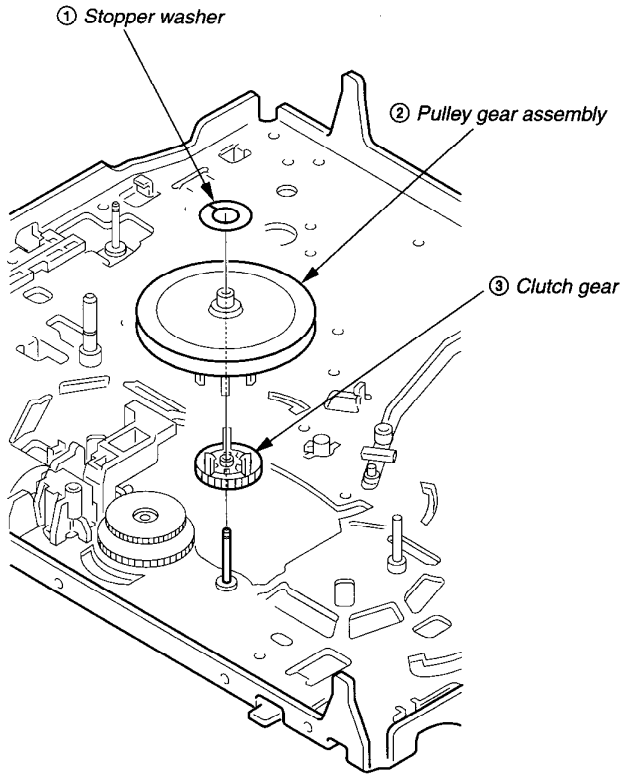


Fig. 3-24

3-20. REEL DIRECT ASSEMBLY

1) Remove rubber belt. (Refer to 3-5.)
2) Remove pulley gear assembly with clutch gear. (Refer to 3-19.)
3) Remove stopper washer ① and reel direct assembly ②.

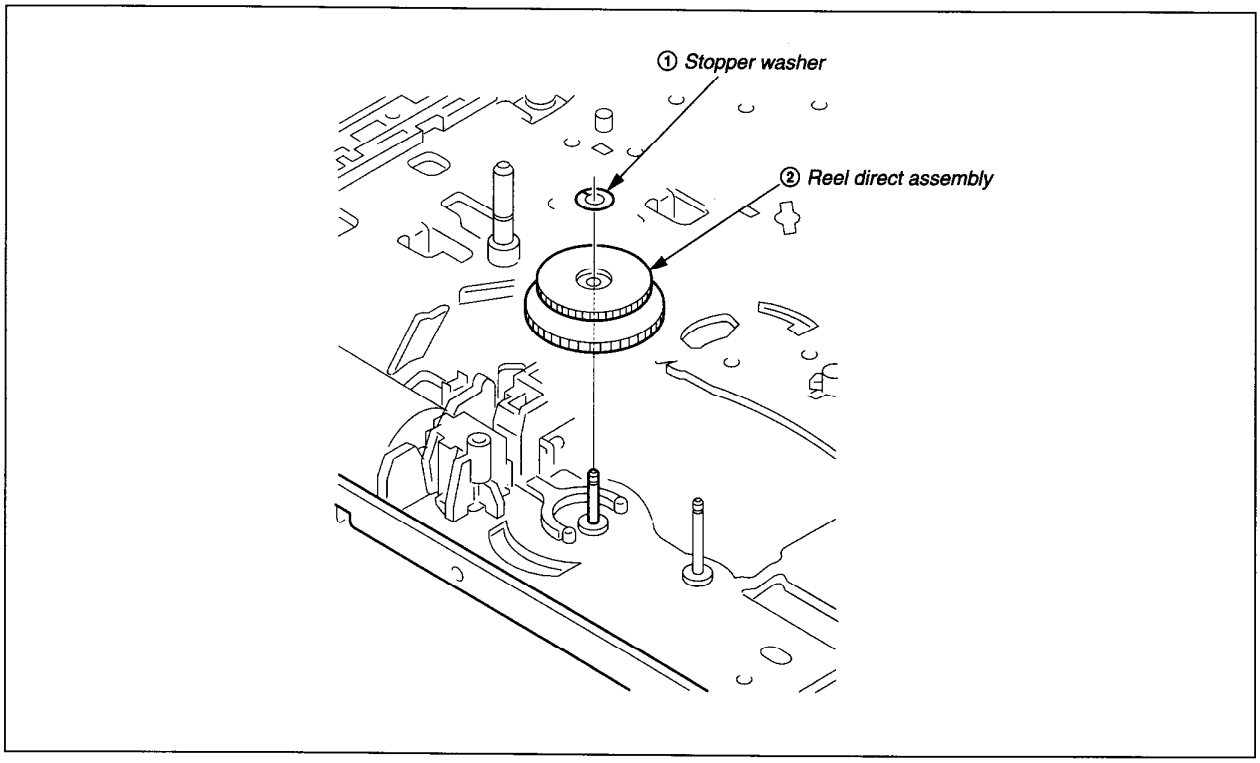


Fig. 3-25

3-21. CASSETTE GUIDE PLATE

1) Remove a screw (P 3 × 8) ① and remove cassette guide plate ②.

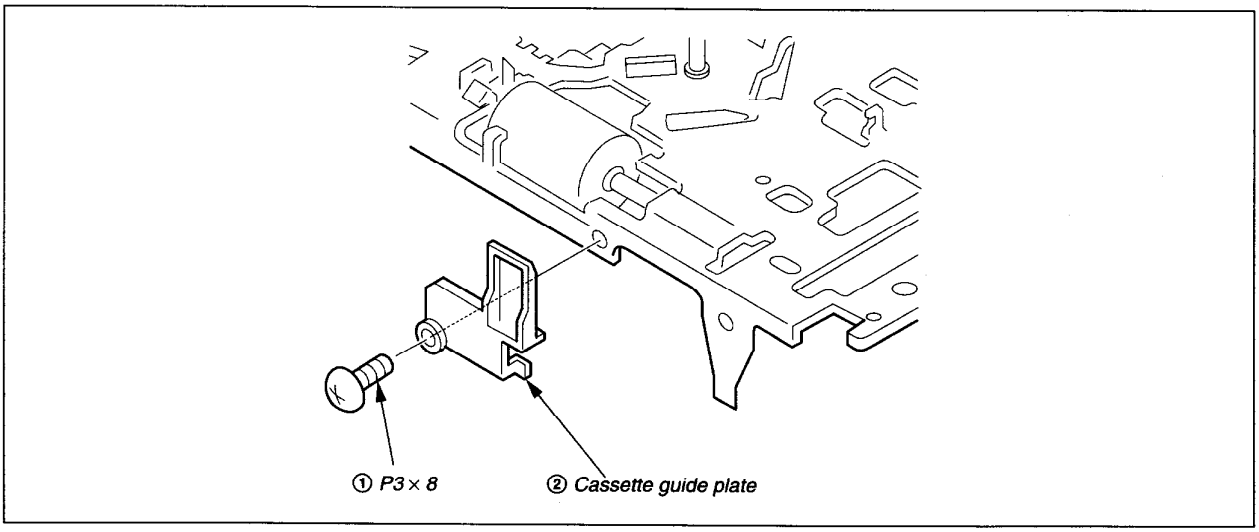


Fig. 3-26

3-23. DRUM BASE, HC ROLLER BLOCK ASSEMBLY

1) Remove the drum assembly. (Refer to 3-2.)
2) Remove screws BVTP 3 × 8 ①.
3) Remove drum base ②.
4) Pull out HC roller assembly ③ straight in the arrow Ⓐ direction.

[Note on Mounting]

- Before attaching drum base ②, confirm the specified locations are coated with grease SG-646 (Ref. No. J-6).
- Tightening screws ① in the order ⓐ to ⓑ to ⓒ.

[Adjustment after Mounting]

- 4-1. Tape path adjustment

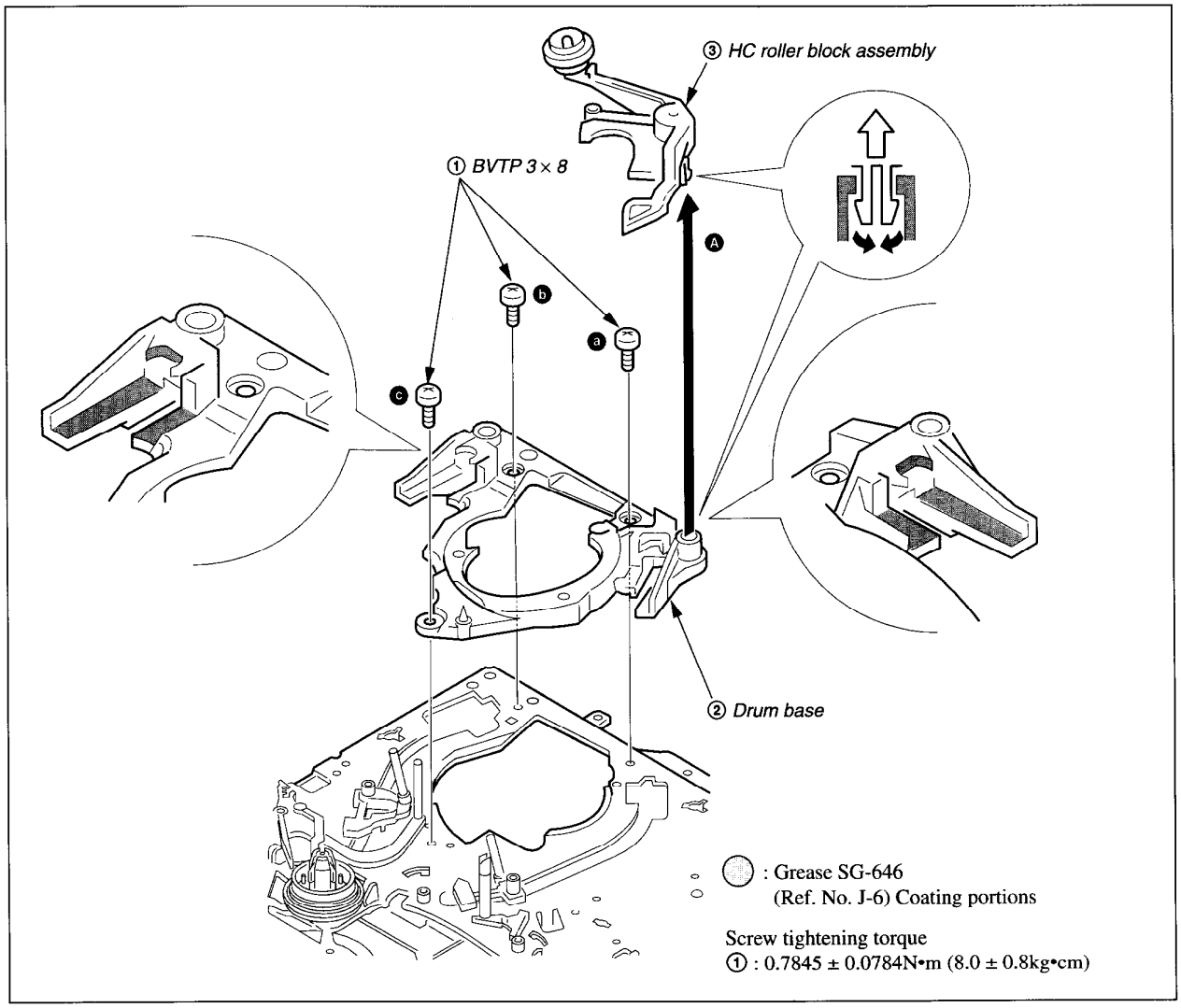


Fig. 3-28

3-24. SHUTTLE (S) AND SHUTTLE (T) BLOCK ASSEMBLIES

1. Guide Roller Assemblies

1) Turn them counterclockwise, then they are out of place, also springs.

[Note on Mounting]

Don't touch the surface that contacts tape with bare hand.

[Adjustment after Mounting]

• 4-1. Tape path adjustment

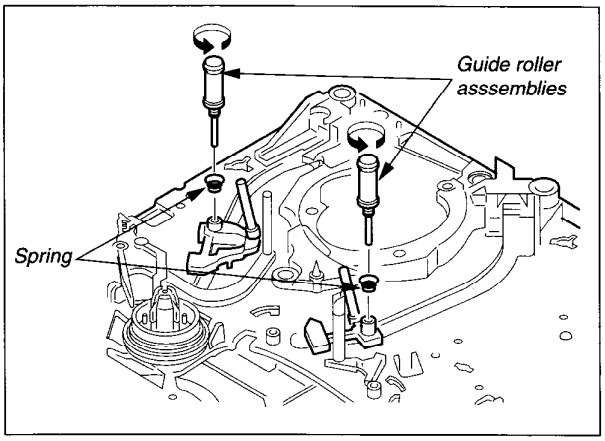


Fig. 3-29

2. Shuttle (S) and Shuttle (T) Assemblies

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove the drum assembly. (Refer to 3-2.)
3) Remove rubber belt. (Refer to 3-4.)
4) Remove FL slider block assembly. (Refer to 3-12.)
5) Remove cam gear. (Refer to 3-13.)
6) Remove slider. (Refer to 3-16.)
7) Remove loading (T) gear assembly and loading (S) gear assembly. (Refer to 3-18.)
8) Remove drum base. (Refer to 3-23.)
9) Remove shuttle (S) or shuttle (T) assembly by slide them backward.

[Note on Mounting]

Don't touch the surface that contacts tape with bare hand.

[Adjustment after Mounting]

• 4-1. Tape path adjustment

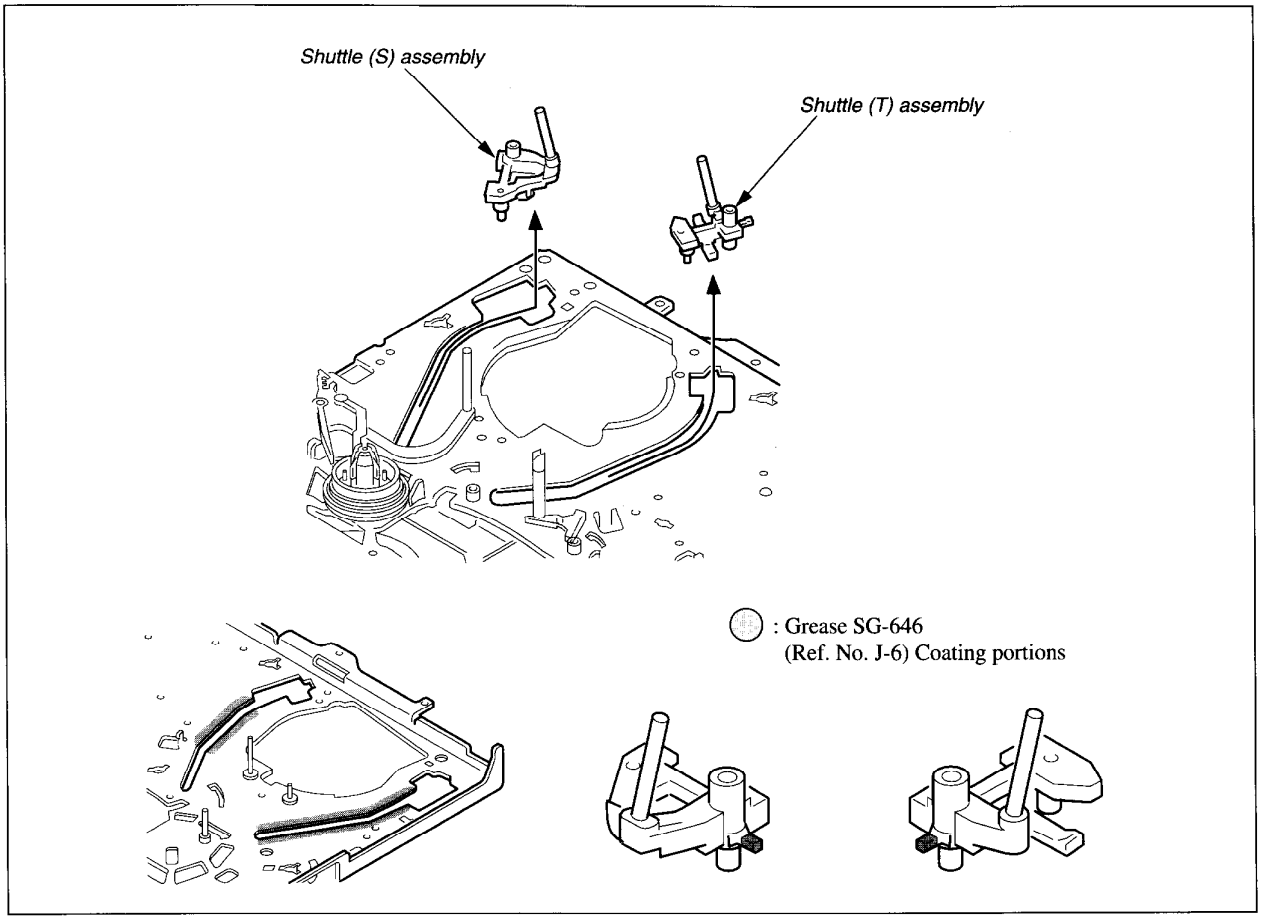


Fig. 3-30

3-25. TG1 ASSEMBLY, REEL (S) TABLE

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove spring (power tension) ① from TG1 driving arm.
3) While spreading claws on the bottom in the arrows Ⓐ direction, pull TG1 assembly ② out.
4) While spreading claws on the top in the arrows Ⓑ direction, pull reel (S) table ③ out.
5) Remove thrust washer ④.

[Note on Mounting]
Don't touch the surface that contacts tape and the braking surface of TG1 assembly with bare hand.

[Adjustment after Mounting]
• 4-1. Tape path adjustment

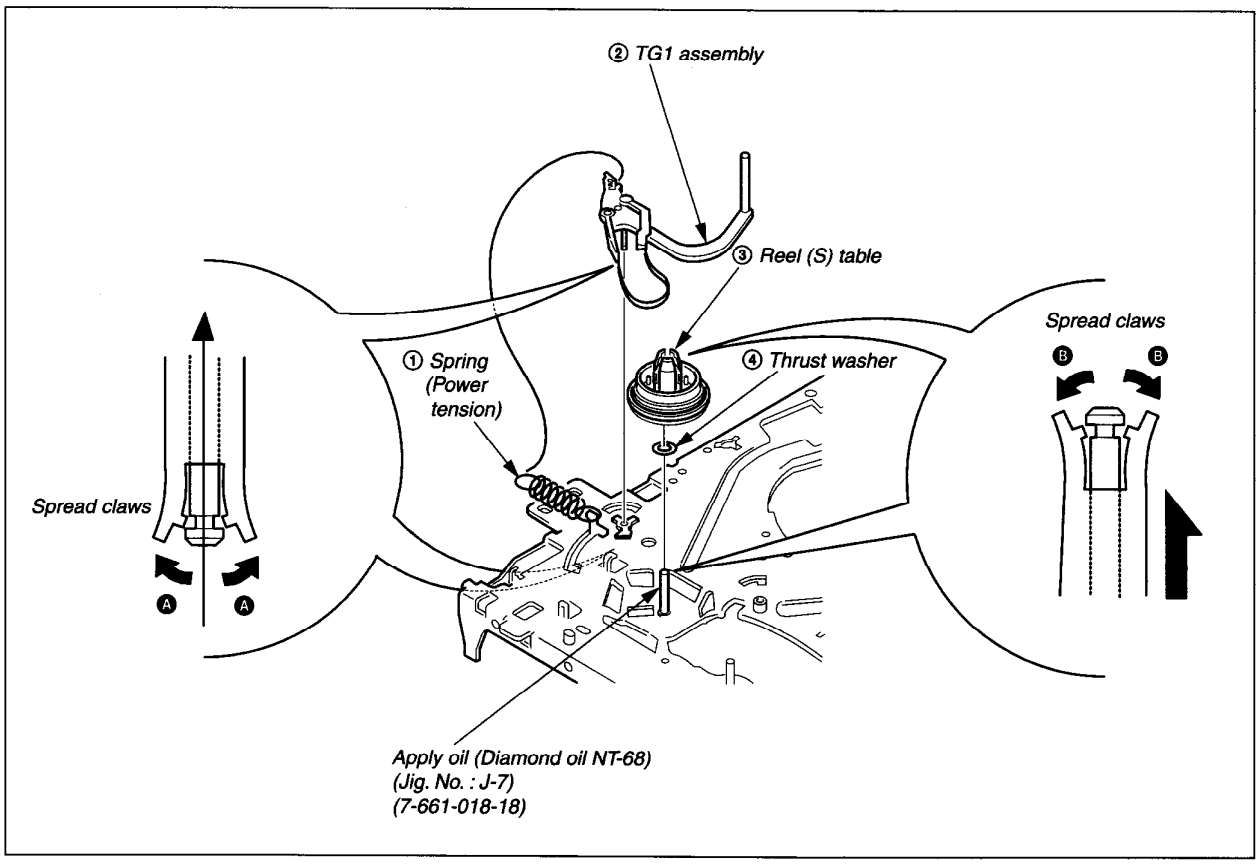


Fig. 3-31

3-26. TG1 FULCRUM BOSS

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove TG1 assembly. (Refer to 3-25.)
3) Turn TG1 fulcrum boss counterclockwise and pull it out.

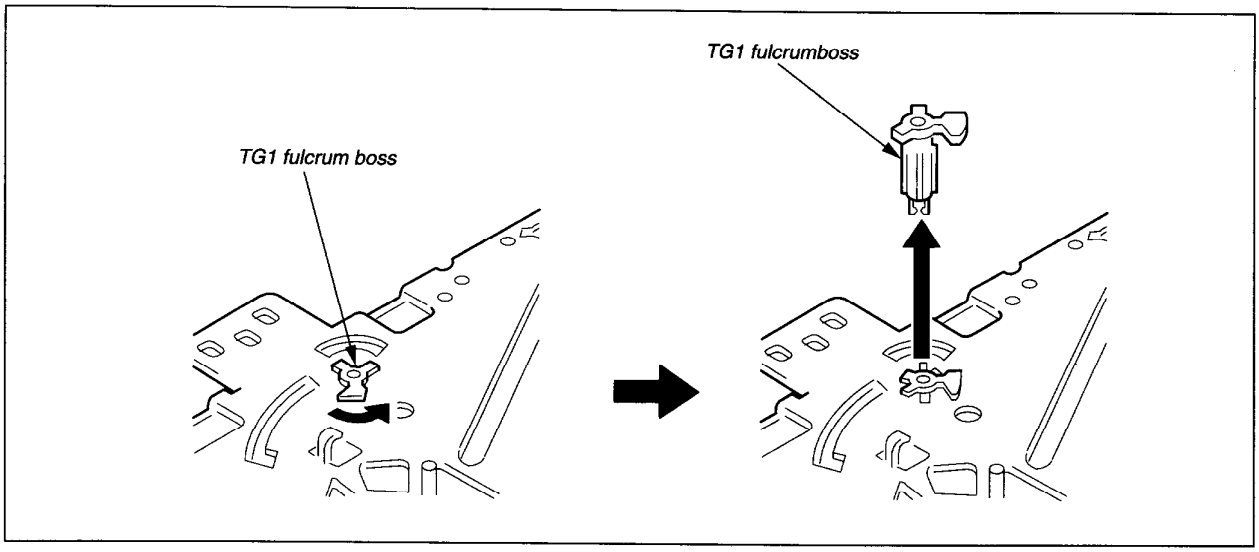


Fig. 3-32

3-27. LUMINOUS PLATE

1) Remove main (T) brake assembly. (Refer to 3-9.)
2) Turn luminous plate clockwise while raising a portion Ⓐ slightly and pull out it.

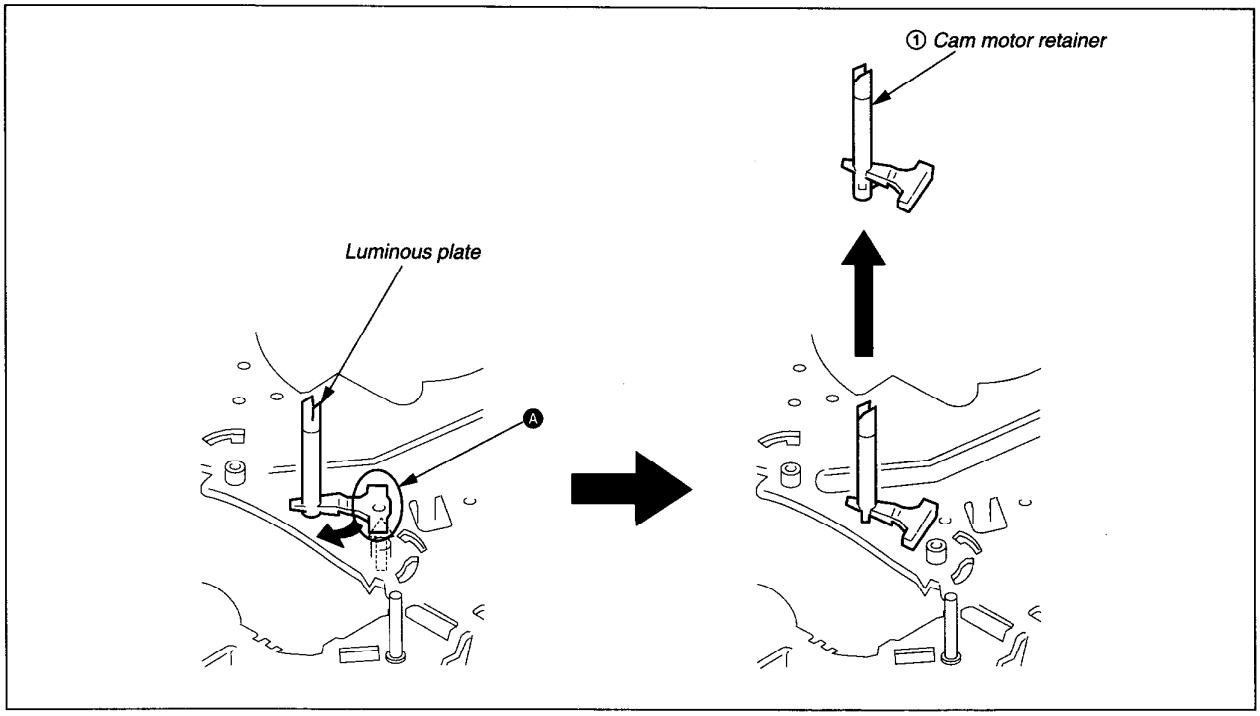


Fig. 3-33

4. ADJUSTMENT

4-1. TAPE PATH ADJUSTMENT

The "Tape path" refers to the route of the tape from the supply reel disk to the take-up reel disc via the video heads.
Each component part of the tape transport system particularly the surface of parts which make direct contact with the tape must always be kept clean, free of dust, oil, scratches and so forth.
The tape path system is factory pre-adjusted, when parts of the tape transport system are replaced, be sure to make the required adjustments as precisely as possible in order to ensure stable tape transport.

4-1-1. TENSION REGULATOR (TG1) POSITION/ TENSION ADJUSTMENT (Fig. 4-1)

Purpose: stabilizes contact of the video head and the tape to maintain the tension of the tape so that it feeds at a constant level.

• Position adjustment

Mode	Threading is completed without a cassette loaded (Playback)
Adjustment locations	Eccentric pin of TG1 band assembly

[Adjustment Method]

1) Allow the unit to go through the threading procedure without a cassette loaded.
2) Set the unit to play back, then turn the eccentric pin so that the tip of tension arm goes to the left side line carved on the mechanical chassis. (Fig. A)
3) After adjustment, go through the loading procedure once more without a cassette loaded, then check the position of the tension arm.

• Tension adjustment

Mode	Playback (SP)
Measuring instrument/tool	Torque cassette VHT-103S (Ref. No. J-1)
Adjustment locations	Position for hooking the tension spring
Specified value	5.05 to 6.52 mN•m (51.5 to 66.5g•cm) (without TC assembly) 3.78 to 5.10 mN•m (38.5 to 52.0g•cm) (with TC assembly)

[Adjustment Method]

1) Playback the torque cassette.
2) Check that the center value deviation reading on the torque cassette meets with the standards.
3) When the reading is higher than the standards : Move the spring toward direction Ⓐ.
   When the reading is less than the standards : Move the spring toward direction Ⓑ.

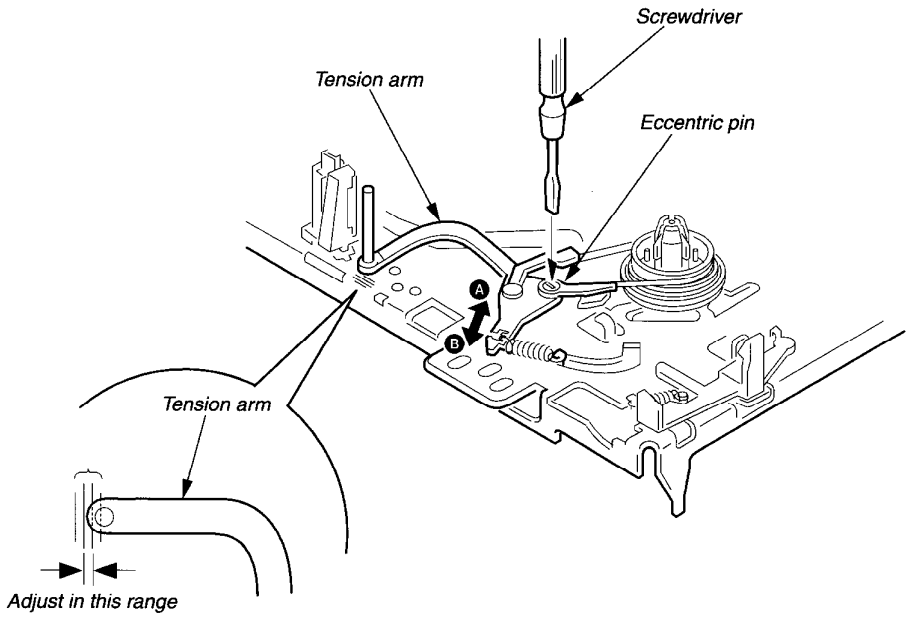


Fig. A

Fig. 4-1

4-1-2. CHECKING THE TENSION AND TORQUE

Purpose : To check that the tension, torque and compression force of the tape take-up section and mobile sections to ensure smooth tape run and achieve standard VTR performance.
If the tape transport is not smooth or problems occur in relation to the tape transport speed, perform the following check.

Mode	Each operation mode
Measuring instrument	Torque cassette VHT-103S, VHT-404S

Item	VTR operation mode	Reel to be measured	Measurement value
Review torque	Review	S reel	12.7 to 19.6 mN•m (130 to 200 g•cm)
Take-up torque	Playback	T reel	4.41 to 10.8 mN•m (45 to 110g•cm)
Back tension torque	Playback	S reel	See section 4-1-1.

4-1-3. X-VALUE ADJUSTMENT (Using the tape having the version No.)

Purpose: To obtain compatibility with other VCRs.

Precaution: Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the [▲] and [▼] tracking control keys, press both the [▲] and [▼] tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking [AUTO/MANUAL] key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape: KRV-52NE (NTSC)/ 52PL(PAL)
Measuring instrument	Oscilloscope TIME/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH1: Connector PB RF pin for RF PC board check CH2: Connector RF SWP pin for RF PC board check
Adjustment locations	ACE base assembly

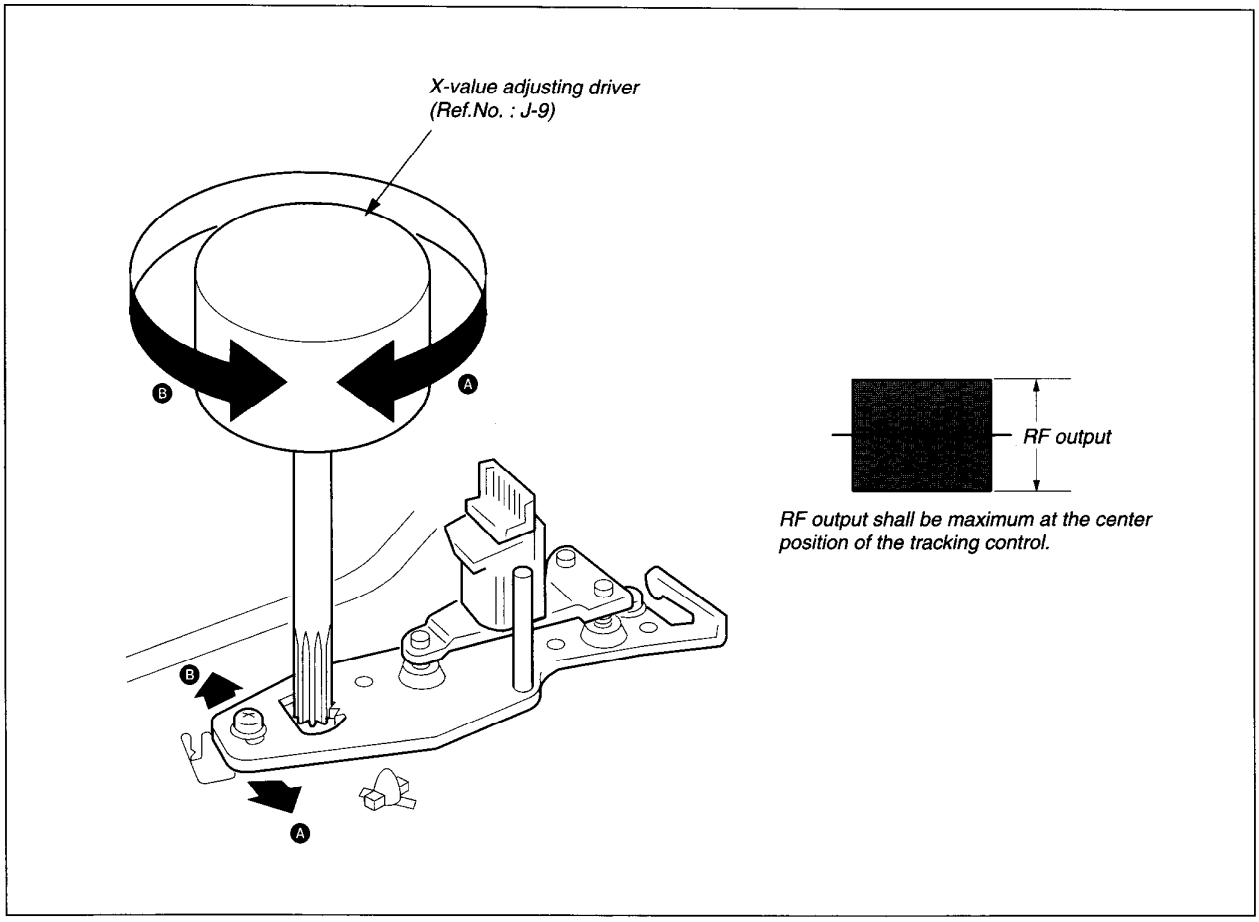


Fig. 4-2

[Adjustment Method]

Set the tracking control at the center position. For the VCRs equipped with standard gap video heads, set the ACE head position with X-value adjusting driver where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the ACE head position with X-value adjusting driver both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

* TYPE OF DRUM

DZH-68D	DZH-89A
DZH-71D	DZH-90A
DZH-77A	DZH-91A
DZH-78A	DZH-92A
DZH-78B	

1. Adjusting X-value (Using the tape having the version No.)

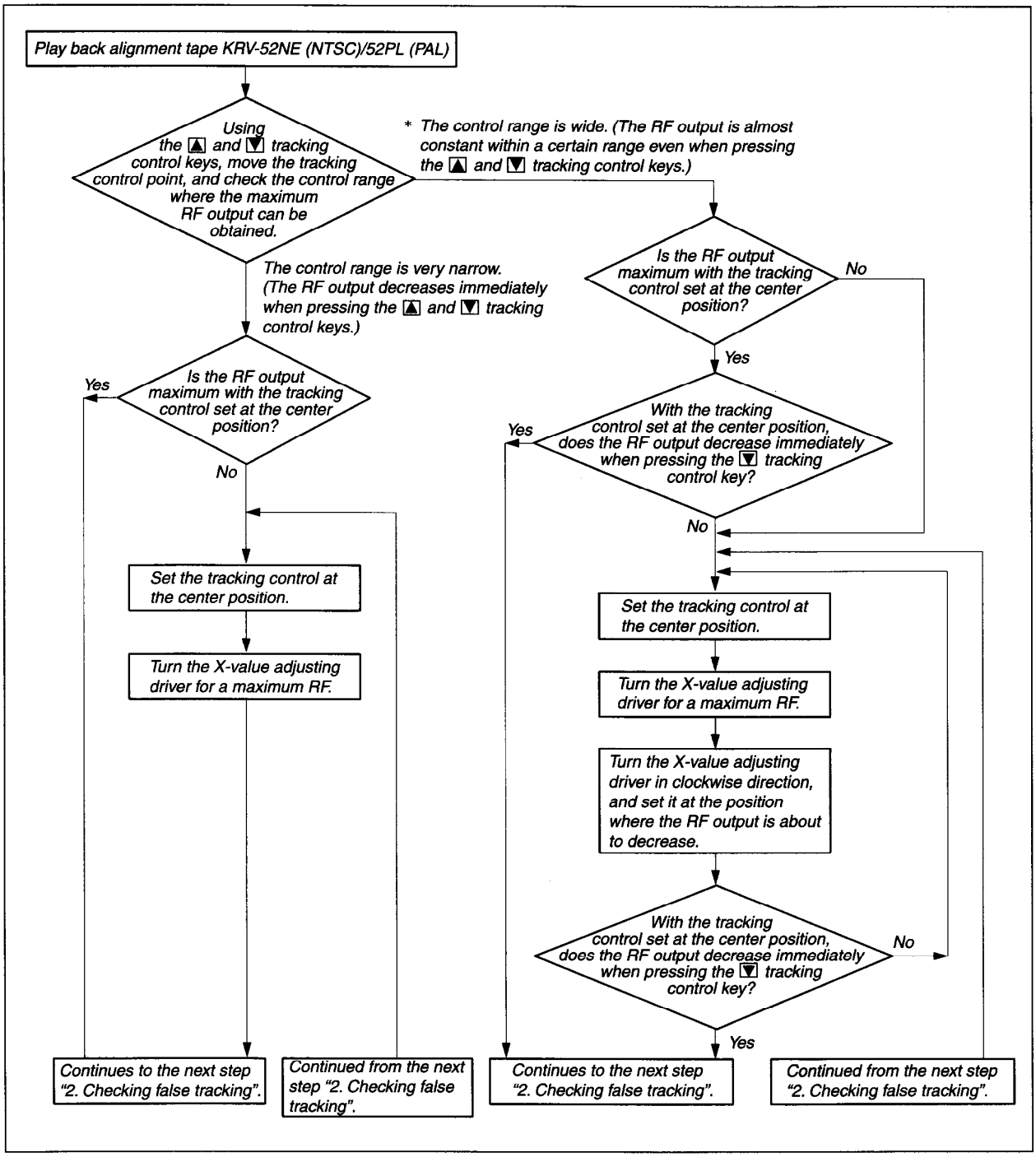

Play back alignment tape KRV-52NE (NTSC)/52PL (PAL)
Using the ▲ and ▼ tracking control keys, move the tracking control point, and check the control range where the maximum RF output can be obtained.
* The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
Is the RF output maximum with the tracking control set at the center position?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF.
Turn the X-value adjusting driver in clockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
No
Yes
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".

Table. 4-1

2. Checking false tracking
(Using the tape having the version No.)

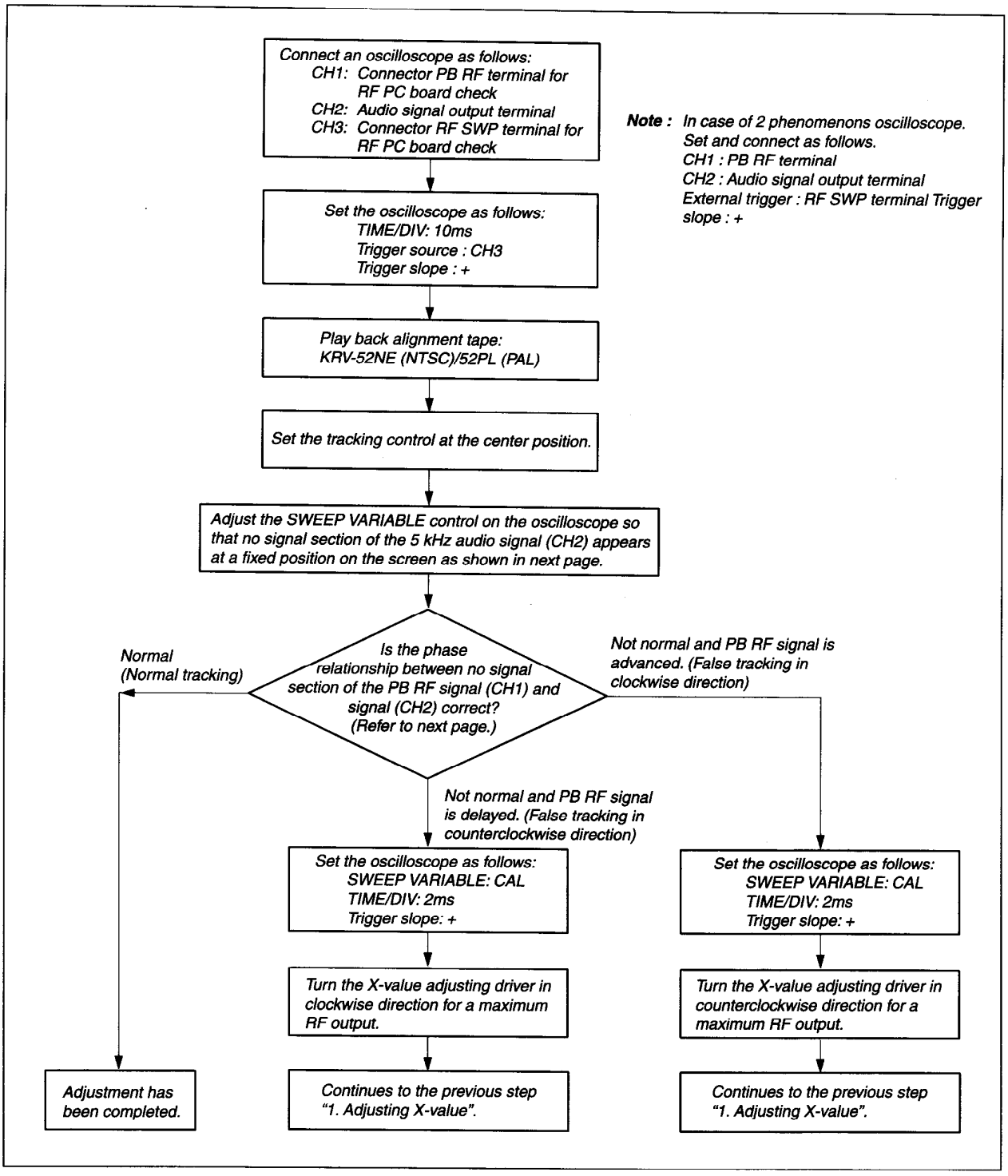

Connect an oscilloscope as follows:
CH1: Connector PB RF terminal for RF PC board check
CH2: Audio signal output terminal
CH3: Connector RF SWP terminal for RF PC board check
Note : In case of 2 phenomenons oscilloscope. Set and connect as follows.
CH1 : PB RF terminal
CH2 : Audio signal output terminal
External trigger : RF SWP terminal Trigger slope : +
Set the oscilloscope as follows:
TIME/DIV: 10ms
Trigger source : CH3
Trigger slope : +
Play back alignment tape:
KRV-52NE (NTSC)/52PL (PAL)
Set the tracking control at the center position.
Adjust the SWEEP VARIABLE control on the oscilloscope so that no signal section of the 5 kHz audio signal (CH2) appears at a fixed position on the screen as shown in next page.
Is the phase relationship between no signal section of the PB RF signal (CH1) and signal (CH2) correct? (Refer to next page.)
Normal (Normal tracking)
Not normal and PB RF signal is advanced. (False tracking in clockwise direction)
Not normal and PB RF signal is delayed. (False tracking in counterclockwise direction)
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjusting driver in clockwise direction for a maximum RF output.
Turn the X-value adjusting driver in counterclockwise direction for a maximum RF output.
Adjustment has been completed.
Continues to the previous step "1. Adjusting X-value".
Continues to the previous step "1. Adjusting X-value".

Table. 4-2

Using the tape having the version No.

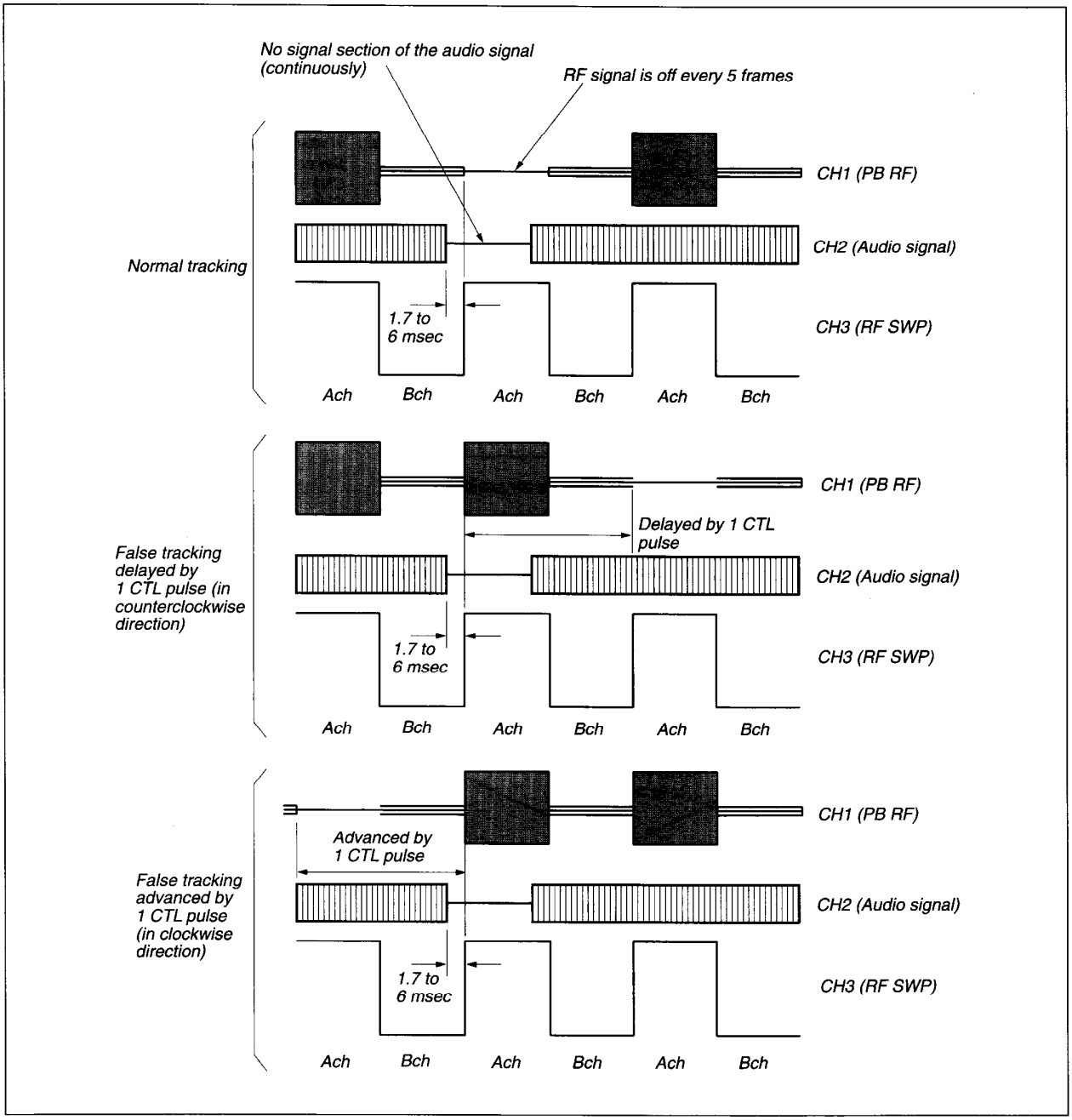


Table. 4-3

[Adjustment Method (*For the VCRs Equipped with Narrow Gap Video Heads)]

Set the tracking control at the center position. Set the ACE head position with X-value adjusting driver both where a maximum RF output is obtained and where the RF output decreases immediately when the ▲ tracking control key is pressed.

* TYPE OF DRUM
DZH-98A

1. Adjusting X-value
(Using the tape having the version No.)

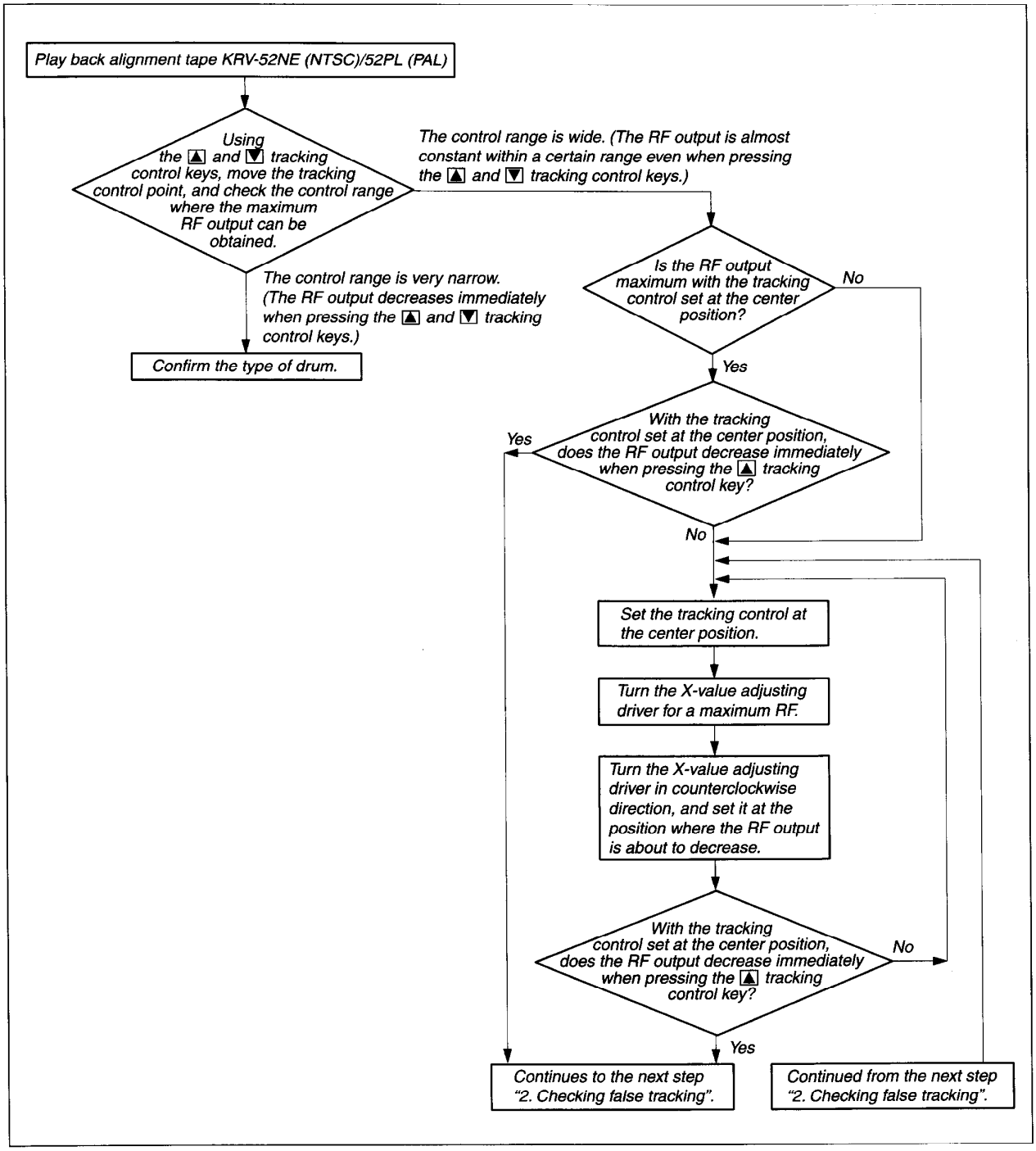

Play back alignment tape KRV-52NE (NTSC)/52PL (PAL)
Using the ▲ and ▼ tracking control keys, move the tracking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Confirm the type of drum.
Is the RF output maximum with the tracking control set at the center position?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▲ tracking control key?
Yes
No
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF.
Turn the X-value adjusting driver in counterclockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▲ tracking control key?
No
Yes
Continues to the next step "2. Checking false tracking".
Continued from the next step "2. Checking false tracking".

Table. 4-4

2. Checking false tracking
(Using the tape having the version No.)

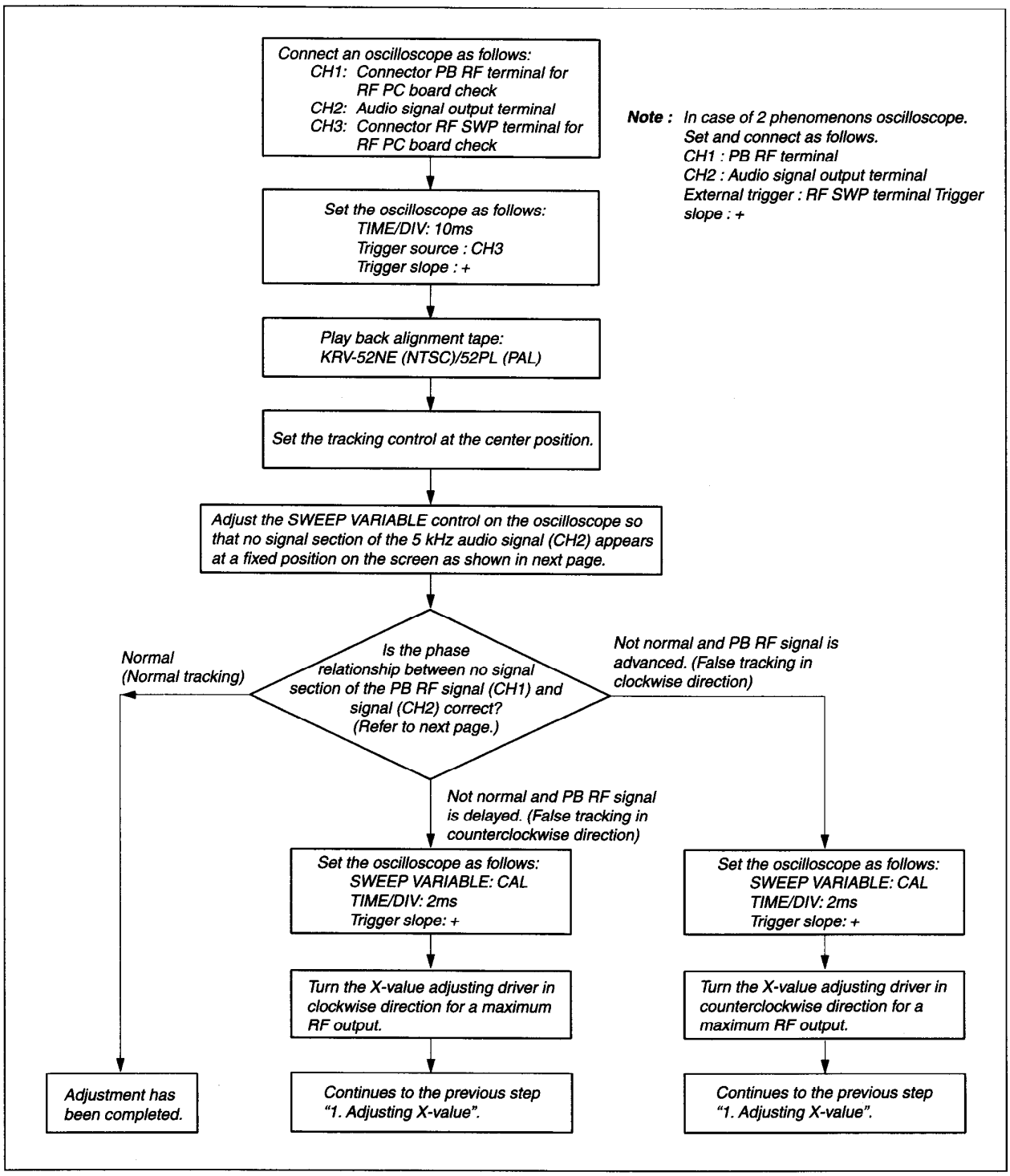

Connect an oscilloscope as follows:
CH1: Connector PB RF terminal for RF PC board check
CH2: Audio signal output terminal
CH3: Connector RF SWP terminal for RF PC board check
Note : In case of 2 phenomenons oscilloscope. Set and connect as follows.
CH1 : PB RF terminal
CH2 : Audio signal output terminal
External trigger : RF SWP terminal Trigger slope : +
Set the oscilloscope as follows:
TIME/DIV: 10ms
Trigger source : CH3
Trigger slope : +
Play back alignment tape:
KRV-52NE (NTSC)/52PL (PAL)
Set the tracking control at the center position.
Adjust the SWEEP VARIABLE control on the oscilloscope so that no signal section of the 5 kHz audio signal (CH2) appears at a fixed position on the screen as shown in next page.
Is the phase relationship between no signal section of the PB RF signal (CH1) and signal (CH2) correct? (Refer to next page.)
Normal (Normal tracking)
Not normal and PB RF signal is advanced. (False tracking in clockwise direction)
Not normal and PB RF signal is delayed. (False tracking in counterclockwise direction)
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Set the oscilloscope as follows:
SWEEP VARIABLE: CAL
TIME/DIV: 2ms
Trigger slope: +
Turn the X-value adjusting driver in clockwise direction for a maximum RF output.
Turn the X-value adjusting driver in counterclockwise direction for a maximum RF output.
Adjustment has been completed.
Continues to the previous step "1. Adjusting X-value".
Continues to the previous step "1. Adjusting X-value".

Table. 4-5

Using the tape having the version No.

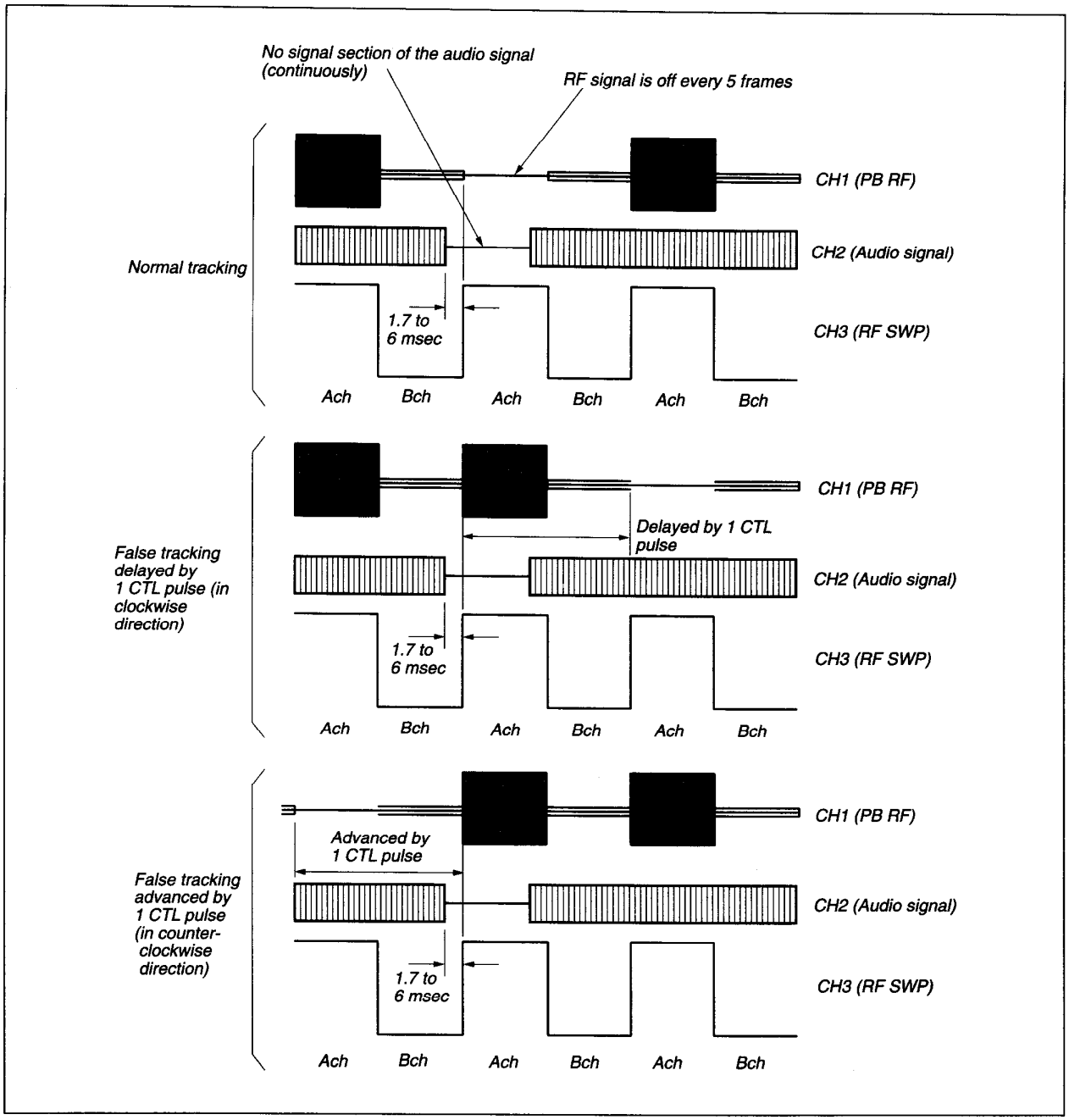

No signal section of the audio signal (continuously)
RF signal is off every 5 frames
Normal tracking
CH1 (PB RF)
CH2 (Audio signal)
CH3 (RF SWP)
1.7 to 6 msec
Ach
Bch
False tracking delayed by 1 CTL pulse (in clockwise direction)
Delayed by 1 CTL pulse
False tracking advanced by 1 CTL pulse (in counter-clockwise direction)
Advanced by 1 CTL pulse

Table. 4-6

3-22. CAM MOTOR ASSEMBLY, LIMITER SELECTION ARM

1) Remove FL complete assembly. (Refer to 3-1.)
2) Remove rubber belt. (Refer to 3-4.)
3) Remove FL slider block assembly. (Refer to 3-12.)
4) Remove worm wheel. (Refer to 3-13.)
5) Remove pulley gear assembly with clutch gear. (Refer to 3-19.)
6) Remove and reel direct assembly. (Refer to 3-20.)
7) Remove cam motor retainer ① in the arrow Ⓑ while pushing its claw in the arrow Ⓐ direction.
8) Then cam motor assembly ② is out of place.
9) Remove the boss of limiter selection arm ③ from the hole on the mechanical chassis by pushing in the arrow Ⓒ direction and push it in the arrow Ⓓ direction and remove it in the arrow Ⓔ direction.

[Note on Mounting]

• Before attaching cam motor assembly ②, confirm the specified locations are coated with grease SG-646 (Ref. No. J-6).

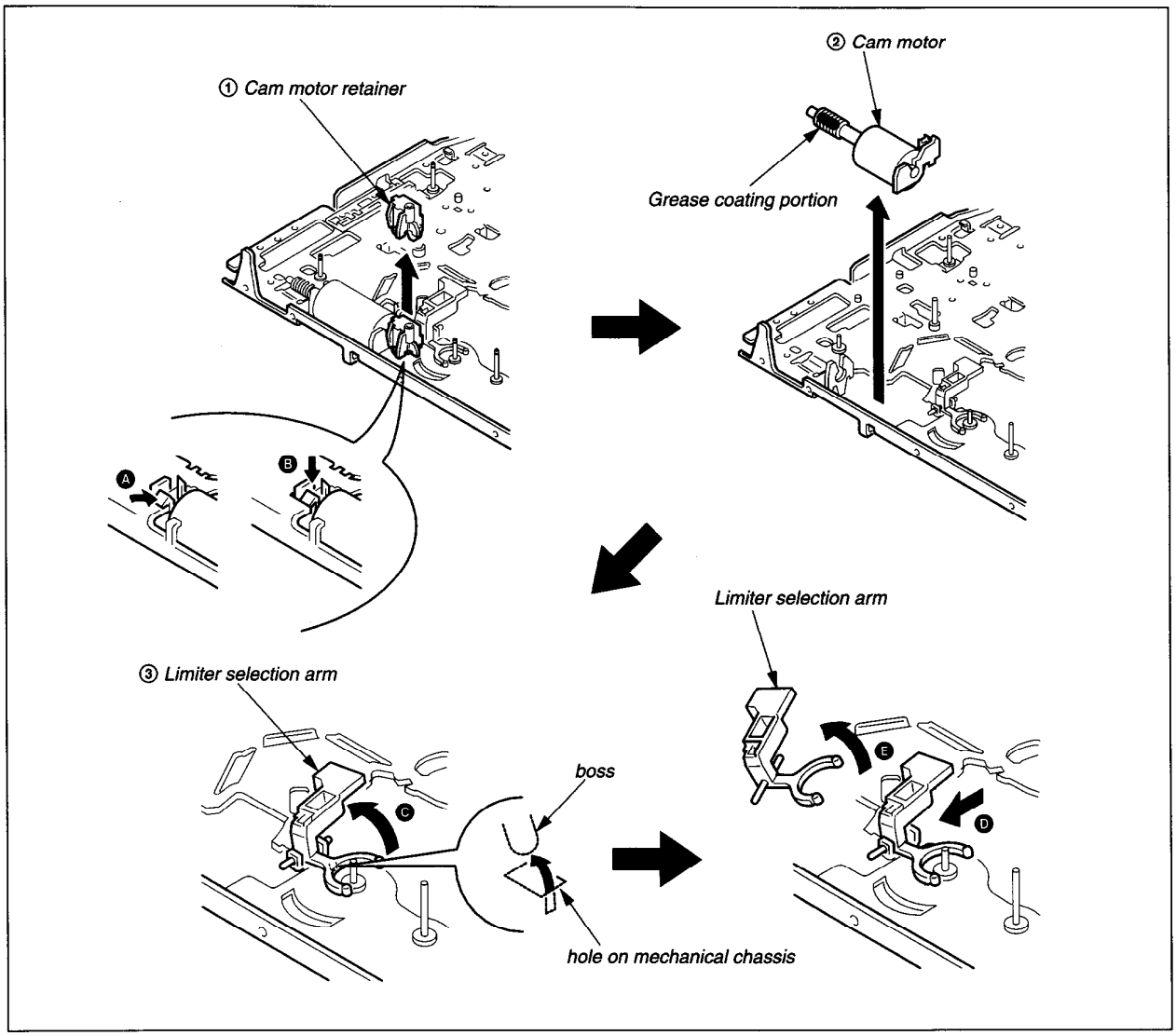


Fig. 3-27

Reference

• X-VALUE ADJUSTMENT
(Using KRV-52NE having no version No.)

Purpose : To obtain compatibility with other VCRs.

Precaution : Before starting to adjust X-value, set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys. Press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).

Mode	Playback
Signal	Alignment tape: KRV-52NE (For NTSC having no version No.)
Measuring instrument	Oscilloscope TIME/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH1: Connector PB RF pin for RF PC board check CH2 : Connector RF SWP pin for RF PC board check
Adjustment locations	ACE base assembly

[Adjustment Method]

Set the tracking control at the center position. For the VCRs equipped with standard gap video heads, set the X-value adjustment screw where a maximum RF output is obtained. For the VCRs equipped with wide gap video heads, set the X-value adjustment screw both where a maximum RF output is obtained and where the RF output decreases immediately when the ▼ tracking control key is pressed.

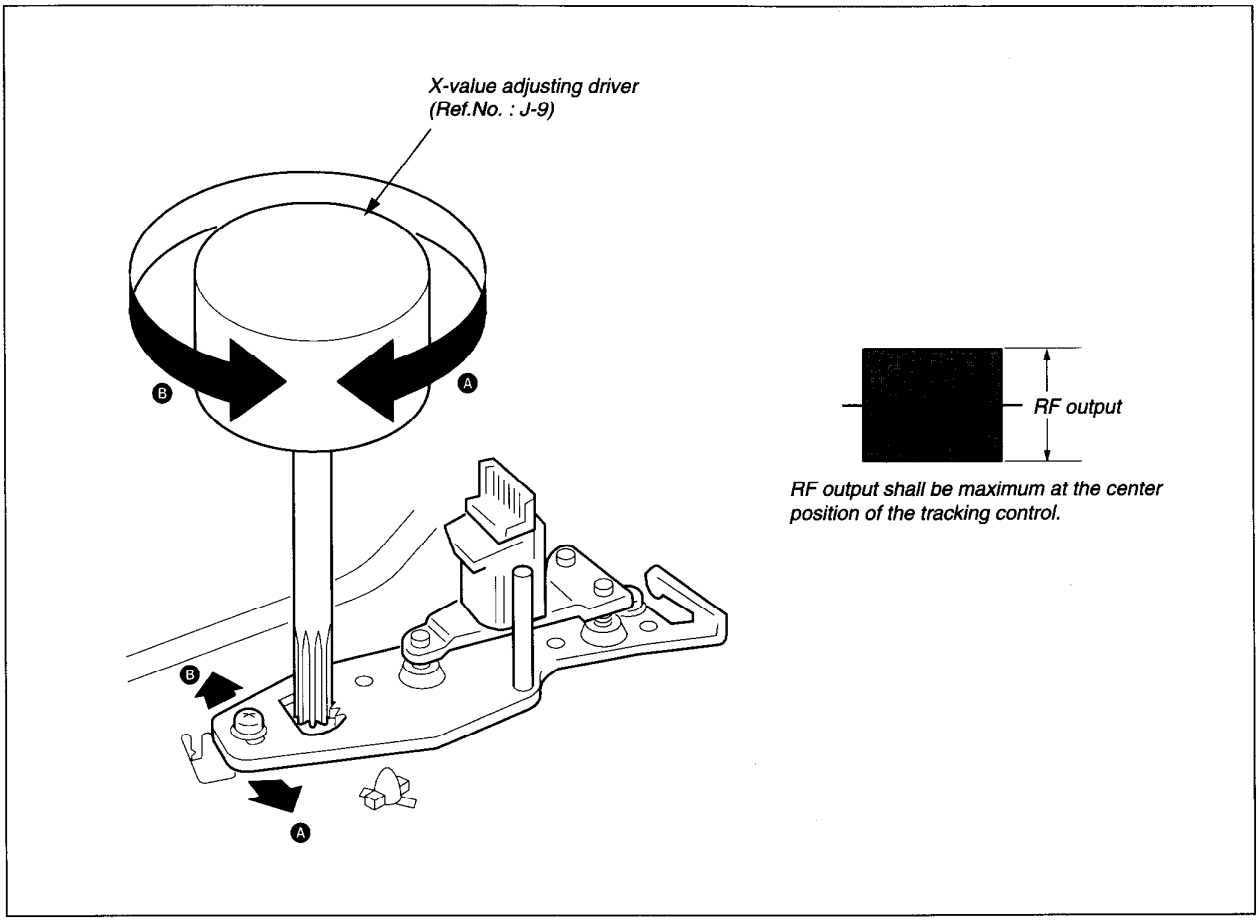


Fig. 4-3

X-VALUE ADJUSTMENT
(Using the tape having no version No.)

* TYPE OF DRUM

DZH-68D	DZH-89A
DZH-71D	DZH-90A
DZH-77A	DZH-91A
DZH-78A	DZH-92A
DZH-78B	

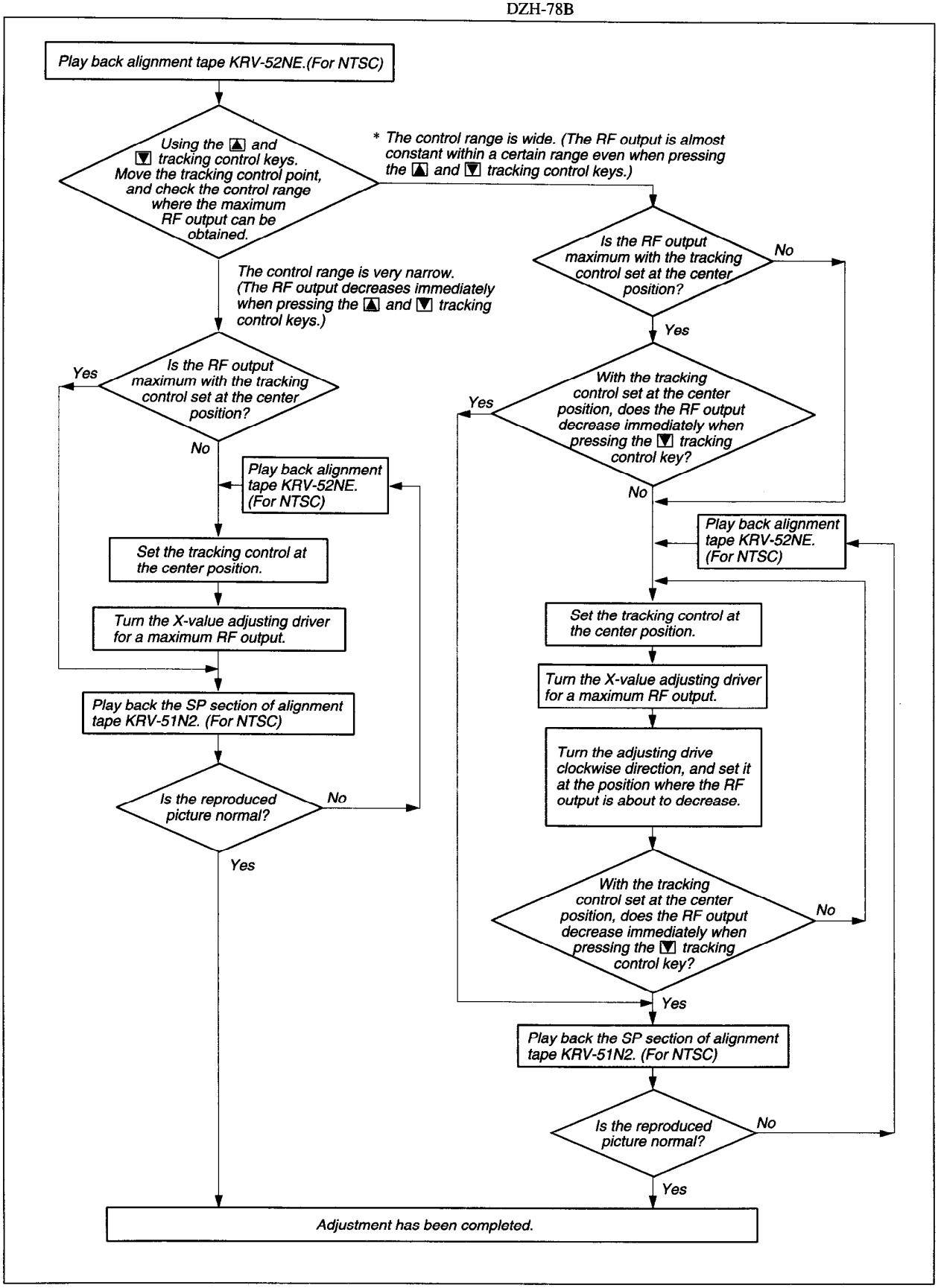

Play back alignment tape KRV-52NE.(For NTSC)
Using the ▲ and ▼ tracking control keys. Move the tracking control point, and check the control range where the maximum RF output can be obtained.
* The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
No
Yes
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Is the RF output maximum with the tracking control set at the center position?
Yes
No
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
Yes
No
Play back alignment tape KRV-52NE. (For NTSC)
Play back alignment tape KRV-52NE. (For NTSC)
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF output.
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF output.
Turn the adjusting drive clockwise direction, and set it at the position where the RF output is about to decrease.
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Is the reproduced picture normal?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▼ tracking control key?
No
Yes
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Is the reproduced picture normal?
No
Yes
Adjustment has been completed.

Table. 4-7

[Adjustment Method (*For the VCRs Equipped with Narrow Gap Video Heads)]

Set the tracking control at the center position. Set the ACE head position with X-value adjusting driver both where a maximum RF output is obtained and where the RF output decreases immediately when the ▲ tracking control key is pressed.

* TYPE OF DRUM
DZH-98A

Using the tape having the version No.

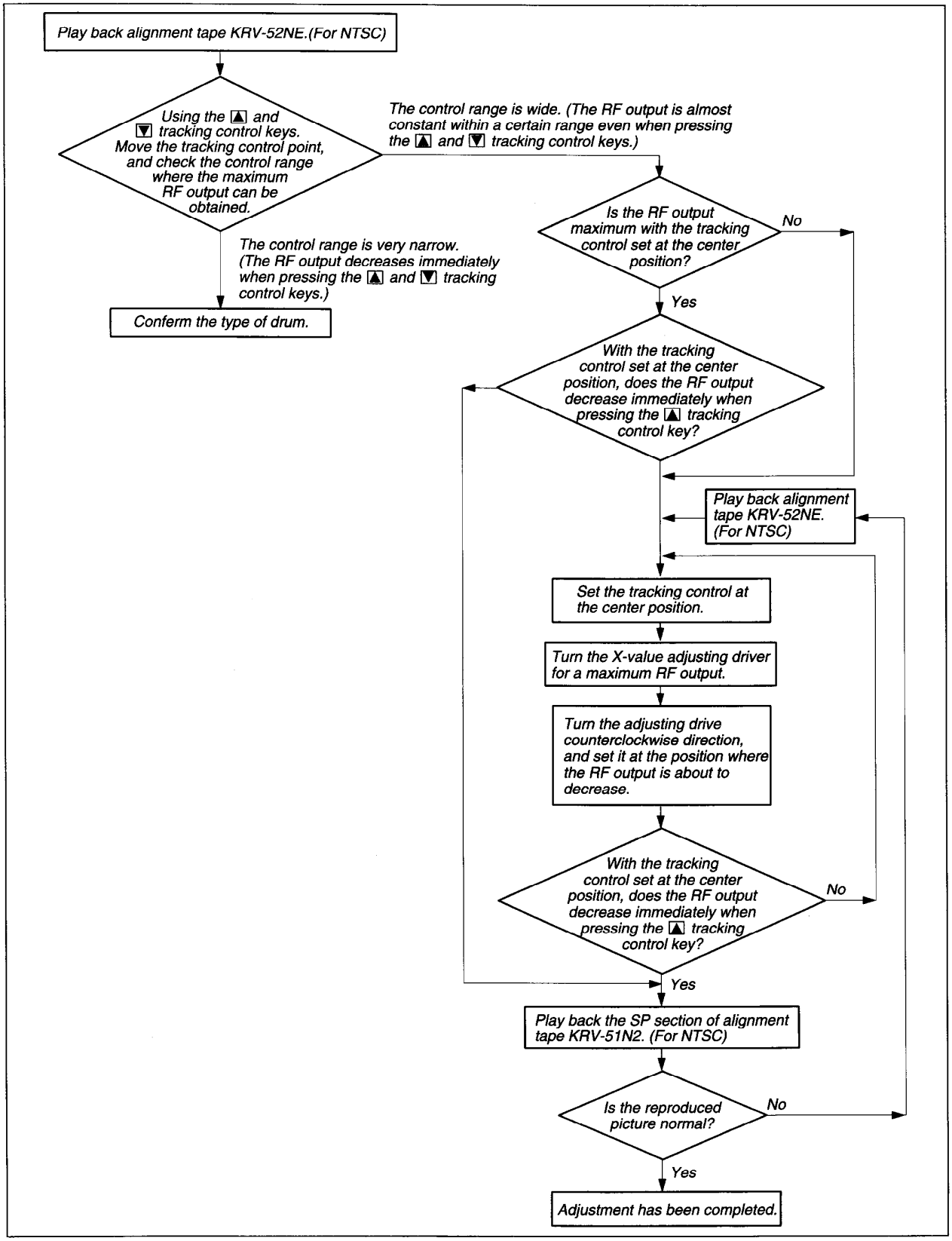

Play back alignment tape KRV-52NE.(For NTSC)
Using the ▲ and ▼ tracking control keys. Move the tracking control point, and check the control range where the maximum RF output can be obtained.
The control range is wide. (The RF output is almost constant within a certain range even when pressing the ▲ and ▼ tracking control keys.)
The control range is very narrow. (The RF output decreases immediately when pressing the ▲ and ▼ tracking control keys.)
Conferm the type of drum.
Is the RF output maximum with the tracking control set at the center position?
No
Yes
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▲ tracking control key?
Play back alignment tape KRV-52NE. (For NTSC)
Set the tracking control at the center position.
Turn the X-value adjusting driver for a maximum RF output.
Turn the adjusting drive counterclockwise direction, and set it at the position where the RF output is about to decrease.
With the tracking control set at the center position, does the RF output decrease immediately when pressing the ▲ tracking control key?
No
Yes
Play back the SP section of alignment tape KRV-51N2. (For NTSC)
Is the reproduced picture normal?
No
Yes
Adjustment has been completed.

Table. 4-9

4-1-4. HEIGHT ADJUSTMENT OF GUIDE ROLLERS NO. 3 AND NO. 6

Mode	Playback
Signal	Alignment tape: KRV-52NE (NTSC)/52PL (PAL)
Measuring instrument	Oscilloscope TIME/DIV: 2ms Trigger source: CH2 Trigger slope: +
Measuring point	CH1: Connector PB RF pin for RF PC board check CH2: Connector RF SWP pin for RF PC board check
Adjustment locations	Height adjustment screw for No. 3 tape guide roller Height adjustment screw for No. 6 tape guide roller

[Adjustment Method]

The following adjustment shall be carried out after completed Section 4-1-2. X-VALUE ADJUSTMENT.

1) Deactivate the automatic tracking control, and set the tracking control at the center position. To set the tracking control at the center position for the VCRs equipped with the ▲ and ▼ tracking control keys, press both the ▲ and ▼ tracking control keys at the same time. For the VCRs not equipped with the tracking control keys, deactivate the automatic tracking control by pressing the tracking AUTO/MANUAL key on the remote control unit during threading operation (after a tape is inserted but before the VCR starts playing back the tape).
2) Check if the RF output changes in amplitude by pressing the tracking control key. The RF output should change periodically (changes from a minimum amplitude to a maximum amplitude, and to the minimum amplitude again).

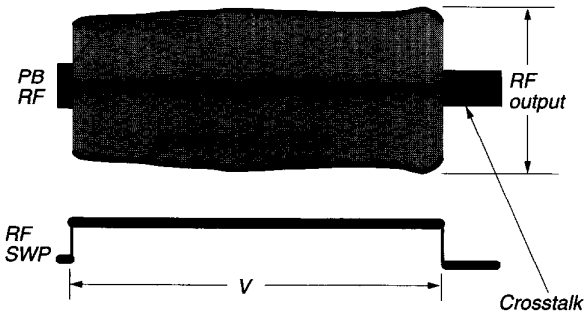


Fig. 4-4

3) Turn the height adjustment screws of tape guide rollers No. 3 and No. 6 so that the RF output envelope becomes as flat as possible.
4) Press the ▲ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.
5) Press the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.

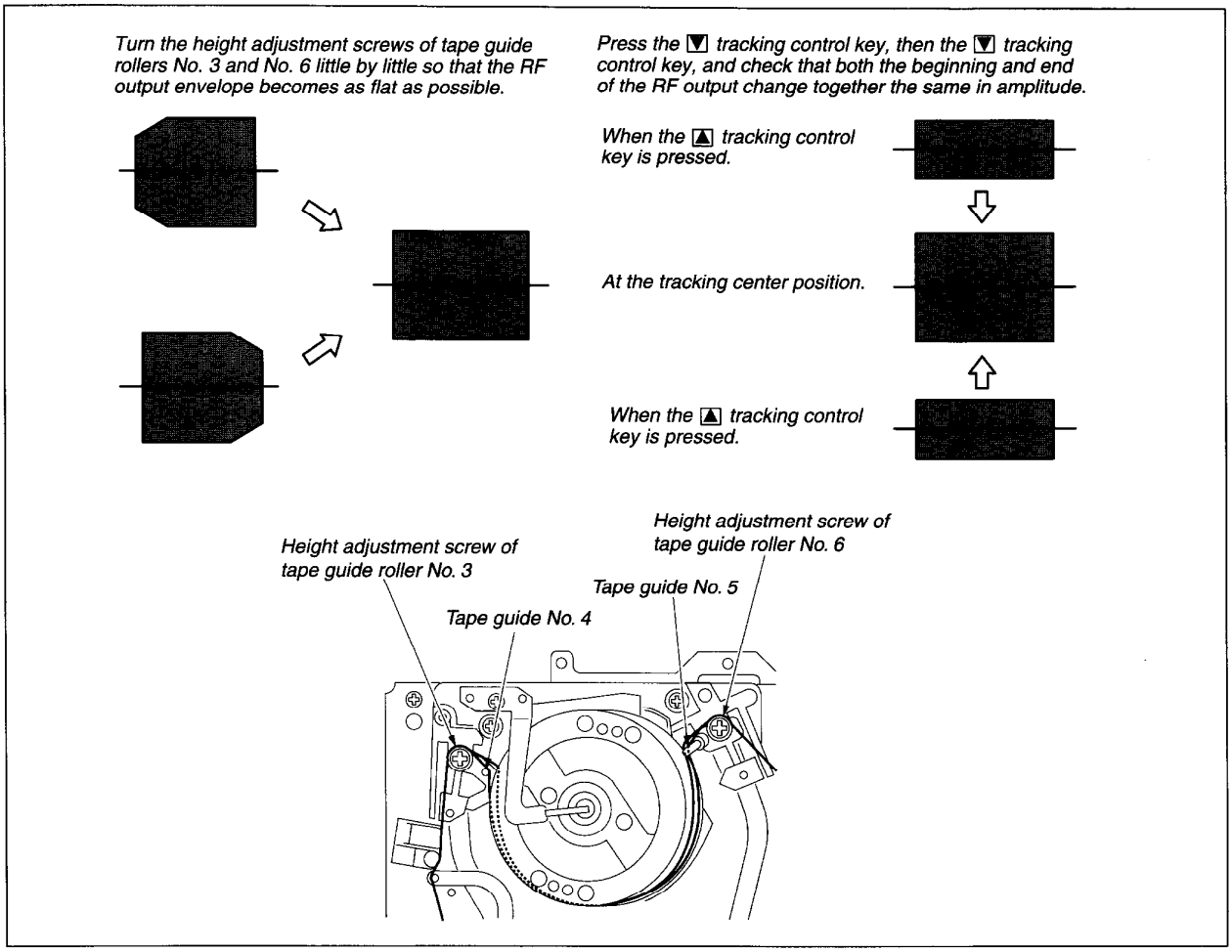

Turn the height adjustment screws of tape guide rollers No. 3 and No. 6 little by little so that the RF output envelope becomes as flat as possible.
Press the ▼ tracking control key, then the ▼ tracking control key, and check that both the beginning and end of the RF output change together the same in amplitude.
When the ▲ tracking control key is pressed.
At the tracking center position.
When the ▲ tracking control key is pressed.
Height adjustment screw of tape guide roller No. 3
Height adjustment screw of tape guide roller No. 6
Tape guide No. 5
Tape guide No. 4

Fig. 4-5

4-1-5. ACE HEAD ASSEMBLY HEIGHT AND AZIMUTH ADJUSTMENT

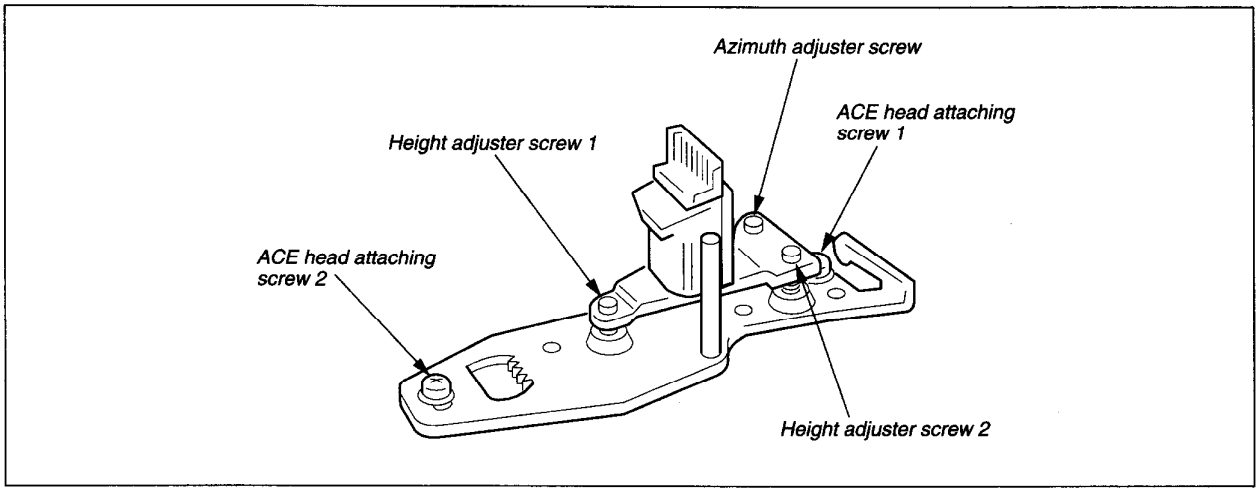

Azimuth adjuster screw
ACE head attaching screw 1
Height adjuster screw 1
ACE head attaching screw 2
Height adjuster screw 2

Fig. 4-6

Mode	Playback
Signal	Alignment tape: (5kHz) KRV-52NE (NTSC)/52PL (PAL)
Measuring instrument	Oscilloscope
Measuring point	Audio output terminal
Adjustment locations	Azimuth adjuster screw, Height adjuster screws 1 and 2.

[Adjustment Method]

1) Adjust the height as shown in the figure with turning the height adjuster screws 1 and 2, and the azimuth adjuster screw in the same direction, the same degree gradually.

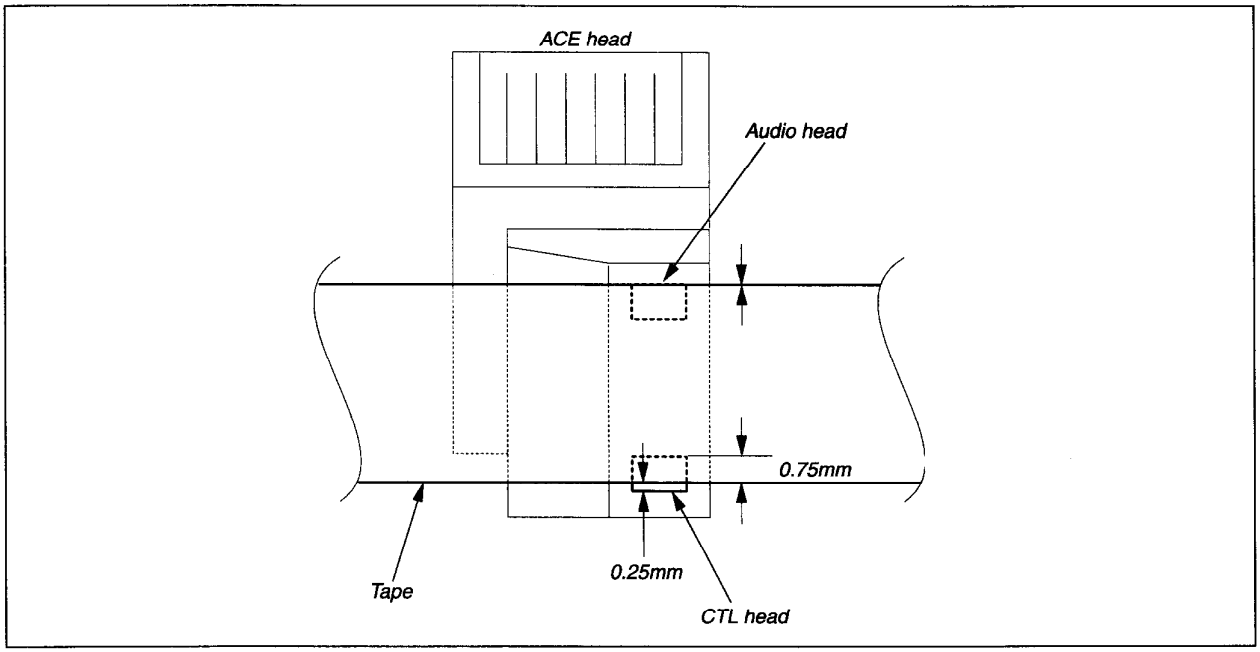


Fig. 4-7

2) Alternately adjust the azimuth adjuster screw to make A maximum and B minimum. (To maintain even audio output at maximum with minimum deviation.)
3) Perform section 4-1-2. X-VALUE ADJUSTMENT.
4) Tighten ACE head attaching screw 2. (Torque: More than 0.29 N•m (3.0 kg•cm)).

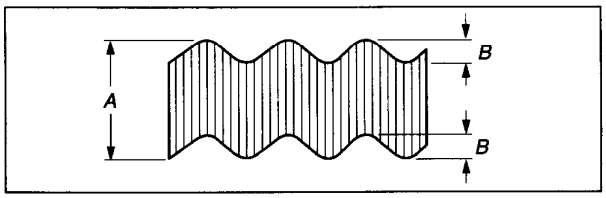


Fig. 4-8

4-1-6. X-VALUE FINE ADJUSTMENT

The procedure is the same as the item 4-1-3. Please refer to pages 37 to 46.

4-1-7. HEIGHT ADJUSTMENT OF GUIDE ROLLER NO. 8

Note : Applicable to the set having TG8 height adjusting screw as shown in the figure. Do not adjust when TG8 height adjusting screw is not attached.

Mode	Playback
Signal	Any signal on thin tape (T-160 or the like) near the tape top.
Adjustment location	TG8 height adjusting screw

[Adjustment Method]

1) Confirm there is no wrinkles of tape between TG8 and capstan and no tape curl at the upper or the lower flanges of TG8 during 10 seconds CUE running.
2) When there is curls or wrinkles, adjust with TG8 height adjusting screw.
3) Confirm there is no wrinkles of tape between TG8 and capstan and no tape curl at the upper or the lower flanges of TG8 during 8 seconds REV running.
4) When there is curls or wrinkles, adjust with TG8 height adjusting screw.

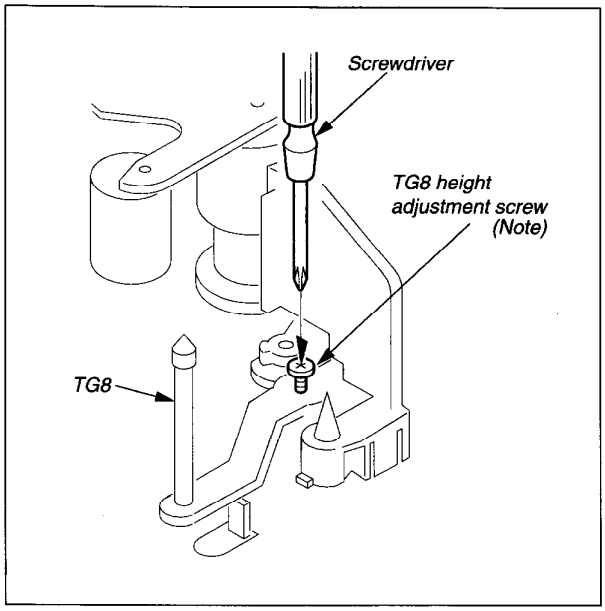


Fig. 4-9

4-1-8. CHECKING THE LINEARITY AND FLUCTUATION OF THE RF OUTPUT

1) Set the RF output to the maximum level using the tracking buttons.

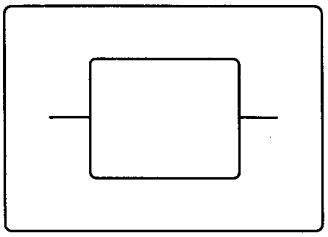


Fig. 4-10-1

2) Perform fine adjustment of the voltage level range of the oscilloscope, adjust the RF output deviation to within 6 gradations.

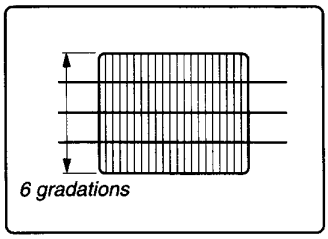


Fig. 4-10-2

3) Press the tracking buttons and adjust the maximum amplitude of the RF output to within 4 gradations.
4) At this time, check if the minimum amplitude is more than 2 gradations.

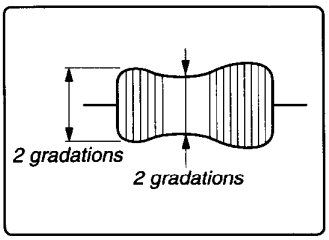


Fig. 4-10-3

5) Check that RF output fluctuation between minimum and maximum levels is within 13%.

5. EXPLODED VIEWS

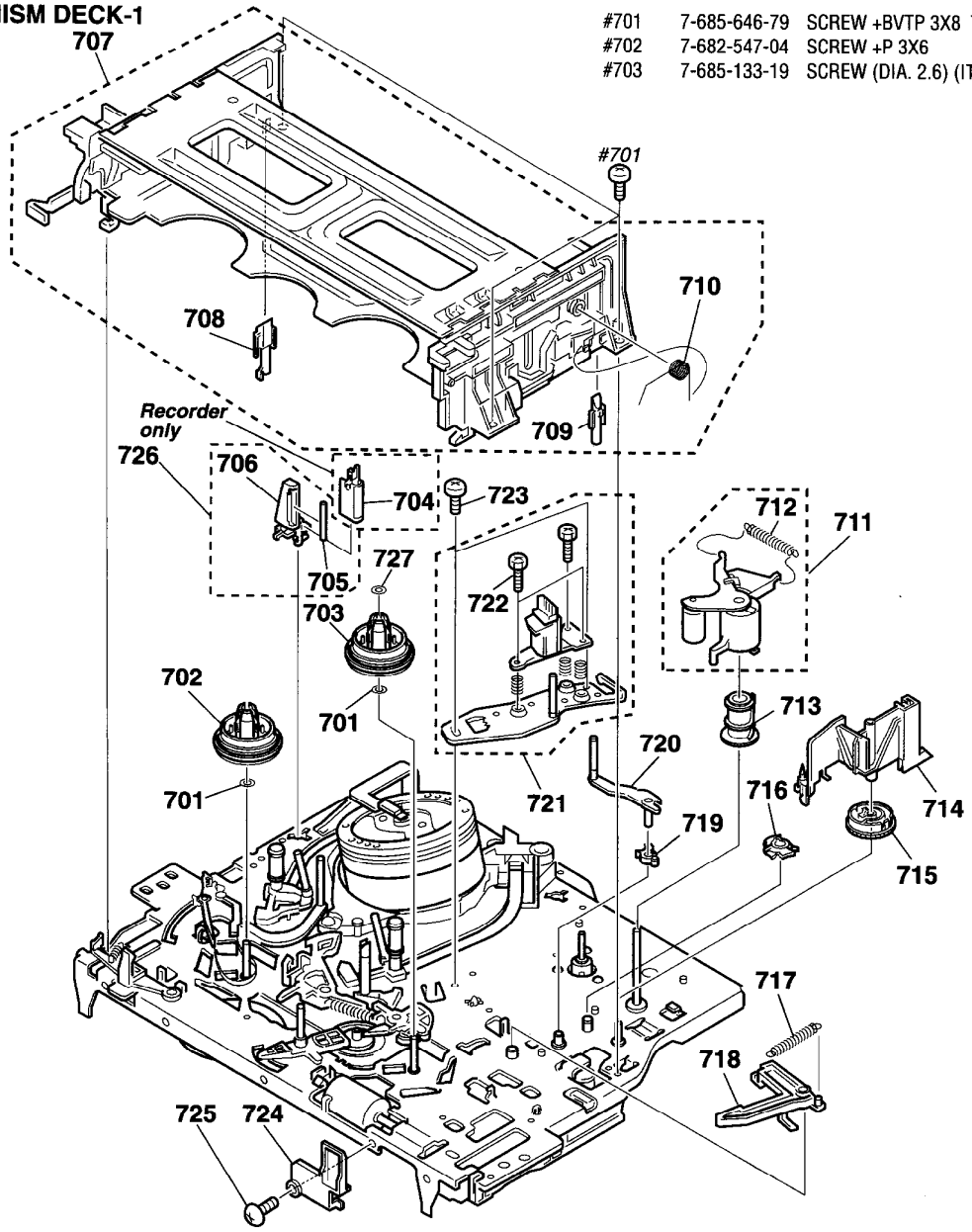
Note:

- -XX, -X mean standardized parts, so they may have some differences from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

****
HARDWARE LIST
****

#701	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3
#702	7-682-547-04	SCREW +P 3X6
#703	7-685-133-19	SCREW (DIA. 2.6) (IT3B)

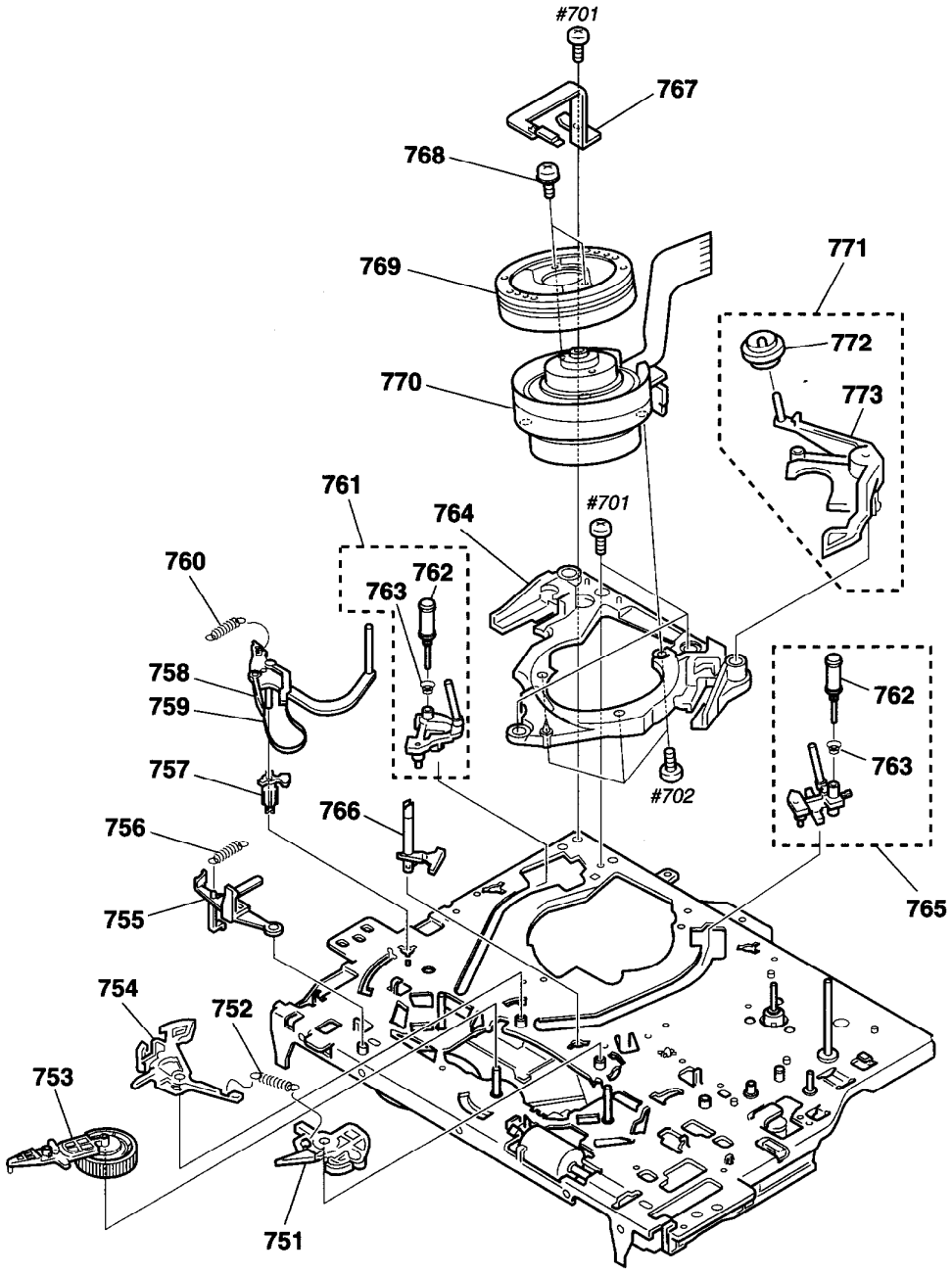
5-1. MECHANISM DECK-1



Ref. No.	Part No.	Description	Remarks
701	3-977-509-01	WASHER, THRUST	
702	3-977-507-01	TABLE, REEL (S) (GRAY)	
703	3-977-508-01	TABLE, REEL (T) (BLACK)	
704	1-500-144-11	HEAD, FE (RECORDER)	
705	3-977-495-01	SHAFT TG2 (RECORDER)	
706	3-977-494-01	HOLDER, FEH (RECORDER)	
707	A-6759-619-A	FL COMPLETE ASSY BOARD, COMPLETE	
708	3-977-535-01	PLATE, LUMINOUS(END SENSOR)	
709	3-977-536-01	PLATE, LUMINOUS(TOP SENSOR)	
710	3-970-471-01	SPRING (DECK OPEN), TORSION	
711	A-6759-615-A	PRESS BLOCK ASSY, PINCH	
712	3-958-455-01	SPRING (PINCH), TENSION	
713	3-977-447-01	GEAR, ELEVATOR	
714	3-977-514-01	OPENER, LID	

Ref. No.	Part No.	Description	Remarks
715	3-977-441-01	GEAR, PINCH PRESSING	
716	3-977-445-01	GEAR, TG8 ARM DRIVING	
717	3-977-465-01	SPRING,EXTENSION(RVS BRAKE)	
718	X-3947-582-1	ARM ASSY, RVS BRAKE	
719	3-977-446-01	GEAR, TG8 ARM	
720	X-3947-590-1	TG8 ASSY	
721	A-6759-620-A	HEAD BLOCK ASSY, ACE (TDK)	
722	3-974-556-01	+ HEXA TT 2.6X9 (TAPER)	
723	3-979-508-01	SCREW	
724	3-978-485-01	PLATE, GUIDE CASSETTE	
725	3-696-519-01	+P IT3 SCREW 3X8	
726	X-3947-817-1	FEH, ASSY (PLAYER)	
727	3-977-443-01	WASHER, STOPPER	

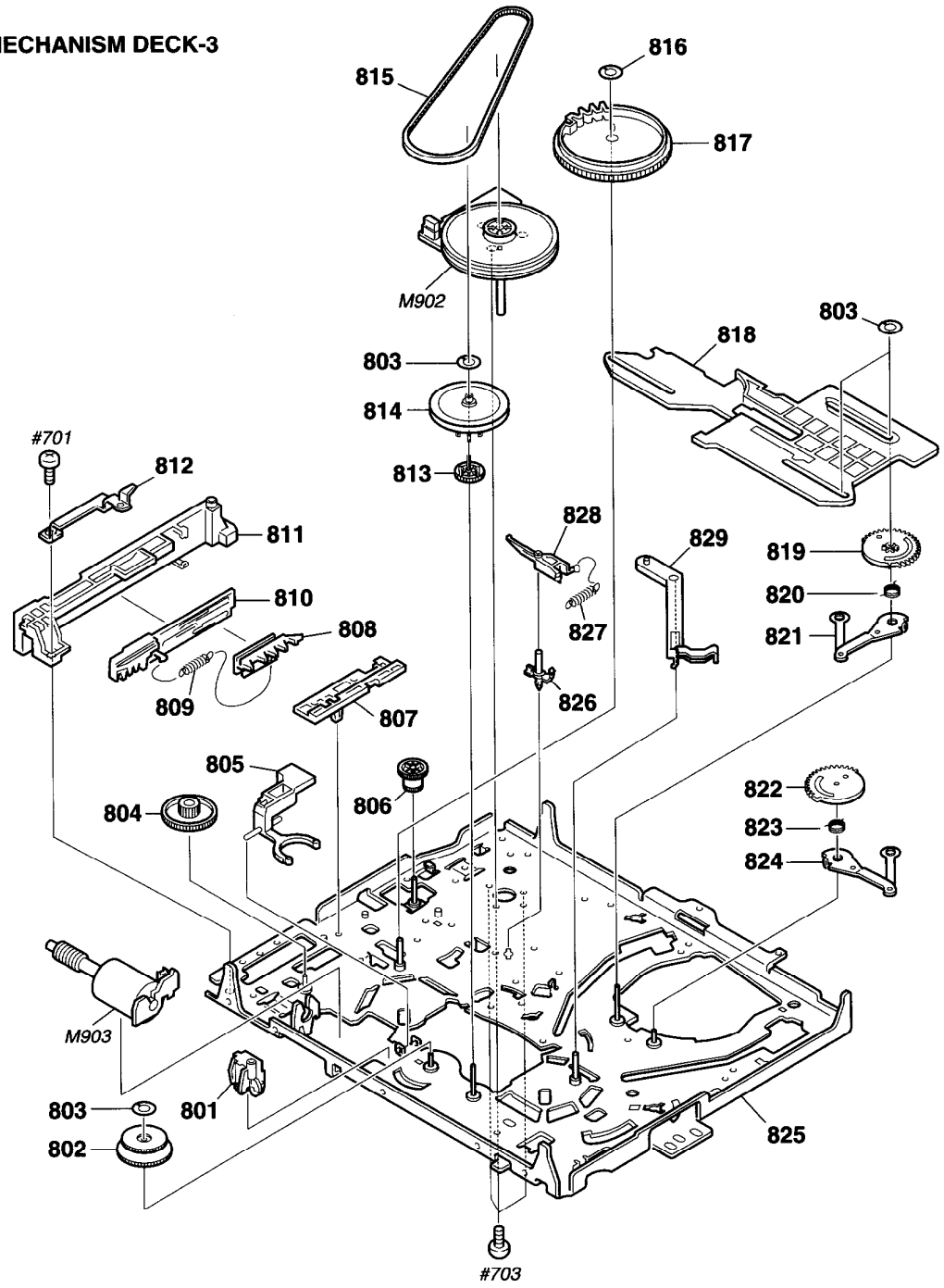
5-2. MECHANISM DECK-2



Ref. No.	Part No.	Description	Remarks
751	X-3947-581-1	BRAKE ASSY,MAIN(T)	
752	3-977-462-01	SPRING,EXTENTION. (MAIN BRAKE)	
753	X-3947-573-1	ARM ASSY, PENDULUM	
754	X-3947-580-1	BRAKE ASSY, MAIN(S)	
755	3-977-513-01	LEVER, REC. PROOF	
756	3-976-767-01	SPRING, TENS. (REC. PROOF)	
757	3-977-487-01	BOSS, TG1 FULCRUM	
758	X-3947-587-1	TG1 ASSY	
759	X-3947-589-1	BAND ASSY, TG1	
760	3-977-488-01	SPRING (POWER TENSION)	
761	A-6750-324-A	SHUTTLE (S) BLOCK ASSY	
762	X-3944-378-1	ROLLER ASSY, GUIDE	

Ref. No.	Part No.	Description	Remarks
763	3-965-178-01	SPRING	
764	3-969-629-01	BASE, DRUM	
765	A-6750-325-A	SHUTTLE (T) BLOCK ASSY	
766	3-977-501-01	PLATE, LUMINOUS	
767	X-3943-899-8	GROUND ASSY, SHAFT	
768	2-643-205-01	SCREW	
769	Refer to the service manual for each model.		
770	Refer to the service manual for each model.		
771	A-6759-614-A	ROLLER BLOCK ASSY, HC	
772	X-3947-255-1	ROLLER ASSY, HC	
773	3-977-537-01	ARM, HC ROLLER	

5-3. MECHANISM DECK-3



Ref. No.	Part No.	Description	Remarks
* 801	3-977-437-01	RETAINER,CAM MOTOR	
802	X-3947-584-1	ASSY, REEL DIRECT	
803	3-977-443-01	WASHER, STOPPER	
804	3-977-438-01	WORM - WHEEL	
805	3-977-506-01	ARM, LIMITTER SELECTION	
806	3-977-444-01	GEAR, PINCH TRANSMISSION	
807	3-977-515-01	GUIDE, FL SLIDER	
808	3-977-517-01	PLATE, SLIDE, FL	
809	3-977-519-01	SPRING, TENS. (LIMIT, FL)	
810	3-977-518-01	PLATE, LIMITTER, FL	
811	3-977-516-01	HOLDER, FL SLIDER	
812	3-977-877-01	PLATE, RETAINER	
813	3-977-504-01	GEAR, CLUTCH	
814	X-3947-585-1	GEAR ASSY, PULLEY	
815	3-977-510-01	BELT, RUBBER	
816	3-977-440-01	WASHER, STOPPER	

Ref. No.	Part No.	Description	Remarks
817	3-977-439-01	GEAR, CAM	
818	3-977-442-01	SLIDER	
819	3-977-455-01	GEAR, LOADING(T)	
820	3-977-456-01	SPRING, TORSION (LOAD T)	
821	X-3947-579-1	LEVER ASSY, LOADING(T)	
822	3-977-451-01	GEAR, LOADING(S)	
823	3-977-452-01	SPRING, TORSION (LOAD S)	
824	X-3947-578-1	LEVER ASSY, LOADING(S)	
825	X-3947-576-1	CHASSIS ASSY, MECHANICAL	
826	3-977-468-01	SHAFT, CAPSTAN BRAKE	
827	3-977-467-01	SPRING, CAP BRAKE	
828	X-3947-583-1	BRAKE ASSY, CAPSTAN	
829	3-977-489-01	ARM, TG1 DRIVING	
M902	1-698-971-11	MOTOR, DC	
M903	X-3947-577-1	MOTOR ASSY, CAM	

9-921-647-13
(Including 9-921-647-11, -12(81))

Sony Corporation
Home A&V Products Company

98E16101-1(2)
Printed in Japan ©1997.10
Published by Quality Assurance Dept.
(Osaki East)